# Income, Inequality and the Welfare State

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**Abstract:** This thesis examines the relationship between income, inequality and the welfare state. Majority voting models explaining how income inequality affects the size of the welfare state suffer from mixed empirical evidence. It is shown, that the positive correlation between voter turnout in elections and socio-economic status is not the driving factor of this drawback. This thesis shows that it comes more from the fact that individuals hold biased perceptions of income inequality and social mobility. In addition, this thesis takes a look at the bottom end of the income distribution, and shows that (some) personality traits and unemployment are related.

**Keywords:** Income distribution, Welfare state, Misperceptions of inequality, Noncognitive skills.

**Kurzzusammenfassung:** Diese Dissertation untersucht den Zusammenhang zwischen Einkommen, Einkommensungleichheit und dem Wohlfahrtsstaat. Medianwählermodelle, welche den Effekt von Einkommensungleichheit auf das Ausmaß der staatlichen Umverteilung erklären, können empirisch nicht eindeutig bestätigt (oder abgelehnt) werden. Hier wird gezeigt, dass die - oft angeführte - positive Korrelation zwischen der Wahlbeteiligung bei Bundestagswahlen und dem sozioökonomischen Status nicht dafür verantwortlich gemacht werden kann. Eine wesentliche Rolle spielt allerdings, dass die Indivduen eine verzerrte Wahrnehmung von der Einkommensungleichheit und der sozialen Mobilität haben. Zusätzlich wirft diese Dissertation einen genaueren Blick auf den unteren Rand der Einkommensverteilung und findet eine Zusammenhang zwischen Persönlichkeitsmerkmalen und Arbeitslosigkeit.

**Schlagwörter:** Einkommensverteilung, Wohlfahrtsstaat, Verzerrte Wahrnehmung der Ungleichheit, Nicht-kognitive Fähigkeiten.

# Contents

# 1 Introduction

## 1.1 Motivation and summary of basic results

The welfare state is a concept of government which is widespread in democratic countries. It aim is to ensure the economic and social well-being of its citizens. But - despite the fact that inequality aversion and the appreciation of equality of opportunity are pronounced in most societies - the relationship between income inequality and the size of the welfare state is puzzling (Kenworthy and Pontusson, 2005; Persson and Tabellini, 2000).

The base model in political economy is the Meltzer-Richard-Model proposed by Meltzer and Richard (1981) and Romer (1975). It predicts that greater inequality leads to higher levels of redistribution in a majority-voting equilibrium. This means that the size of government is determined by the relative position of the political decisive agent (here: median voter) in the income scale. If the median voter earns a gross income below mean gross income she will gain from redistribution. The higher the distance between median gross income and mean gross income, the more the median voter will gain from redistribution and, consequently, the more she will demand for redistribution. The empirical evidence of the theoretically convincing framework is mixed. Some studies find a positive link, some find a negative relation, and other find no significant link at all. The first part of this thesis aims to find a reason for the ambiguous empirical evidence for this theoretical framework.

Chapter 2 starts with the observation that voter turnout and socio-economic status are correlated (DeNardo, 1980; Mueller and Stratmann, 2003; Powell Jr., 1980; Verba and Nie, 1972; Verba et al., 1978). If the relative position of the (decisive) median income changes when concentrating the analysis on voters, policy outcomes might be biased in favor of citizens with higher socio-economic status. Blais (2000) indeed shows that the median income of voters is higher than the median income of the share of population eligible to vote in the US. In a majority-voting equilibrium this would result in a lower level of redistribution compared to an election which gives the same weight to all citizens. In Chapter 2 the voters' income distribution is compared to the distribution of incomes in the overall German society. Both

income distributions are calculated on base of the German Socio-Economic Panel (G-SOEP) 2013. Of course, it will only make a difference using the overall income distribution or voters' income distribution in political economy models if there is a difference in crucial parameters. Although voter turnout in the 2013 general election to the German Bundestag differed considerably across income brackets, the income distribution of voters did not differ, in a statistically significant way, from that of the entire population. The non-uniform turnout, thus, is unlikely to affect the political support for, or the feasibility of, policies that are sensitive with respect to the income distribution. All in all, the positive correlation between voter turnout and socio-economic status cannot explain the mixed empirical evidence of the Meltzer-Richard-Model. Thus, further investigations are required.

The empirical literature on income inequality and the size of the welfare state differ in the inequality measures used. But what all have in common is that it is assumed that income inequality is known by the citizens. Chapter 3 challenges the validity of this assumption. There is evidence that individuals hold erroneous beliefs about distributions of outcomes in general. Typically, they underestimate the range of outcomes and consider their relative rank to be better than it really is. If this can be applied to income inequality and individuals own income rank, less redistribution should emerge in a majority voting equilibrium if preferences for redistribution are based on perceived income inequality and not on factual income inequality. This may lead to a different assessment of the validity of the Meltzer-Richard hypothesis. Existing measures of perceived inequalities (used by political and social scientiests) do not take into account potential biases from incorrect self-positioning. But in a majority-voting equlibrium the bias from incorrect self-positioning is the most important factor. Therefore, a new measure of perceived inequality is designed in Chapter 3. It is shown that the Meltzer-Richard hypothesis works quite well empirically, if based on this perceived income distributions rather than on objective ones.

The Prospect of Upward Mobility (POUM) hypothesis is a comprehensive extension of the Meltzer-Richard framework. Chapter 3 ends with applying the idea that perceptions (of upward mobility) rather than facts drive redistributive politics to the POUM framework. Again, regressions using perceptions perform better then regressions relying on factual data. Overall, observations suggest that political preferences and choices might depend more on perceptions than on facts and data.

Insights provided by Chapter 3 encourage to learn more about perceptions of inequality in Germany. Chapter 4 presents a survey experiment which asks what Germans think and know about inequality. The survey studies 1100 representative households in Germany in 2015. Respondents' preferences for redistribution, their average household income per month, their perceptions of their own income rank within the German income distribution and their per-

ceptions and preferences of social stratification in general were requested. The treatment group was informed about the income distribution, repondents' actual relative position and the self-positioning bias before they were asked to state their preferences again. The aim was to test whether confronting agents' biased perceptions with accurate information have a significant effect on their stated preferences. As Chapter 4 shows, Germans are unable to assess their own position in the income distribution of their country and do not know much about income inequality and stratification. They are well aware of their ignorance. Germans would prefer society to be more egalitarian than they perceive it. Providing accurate information about the income distribution does not change this preference for more redistribution – except among those who learn that they are net contributors in the German tax-transfer system.

The first part of this thesis focuses on the overall income distribution and the size of the welfare state. The second (and last) part shifts the focus away from the overall income distribution towards the very bottom of the income distribution. Chapter 5 studies the relationship between unemployment and unemployment benefits on the one hand and noncognitive skills on the other hand. Empirical evidence suggests that labor markets give an advantage to individuals with high levels of the Big Five dimensions *conscientiousness* and *agreeableness* (Cuesta and Budría, 2017; Egan et al., 2017; Fletcher, 2013). Less conscious and agreeable individuals need to make more effort to find and keep a suitable employment. The question is whether the existence of the welfare state decreases the extrinsic motivation for taking this effort. In this case, the welfare state would systematically lower the inhibition threshold of being unemployed. Using the G-SOEP, Chapter 5 shows that - in Germany - unemployment and both personality traits are indeed related. Individuals with low scores in the Big Five dimensions conscientiousness and agreeableness have a higher probability of being unemployed, have longer unemployment durations, and experience more status changes between employment and unemployment. Results suggests that personality is an important determinant of women's risk of unemployment, but for men personality is more a matter of job keeping.

## 1.2 Structure

This thesis consists of five chapters which examine the relationship between income, inequality and the welfare state from different empirical perspectives.

Chapter 2 is co-authored with Andreas Wagener, Institute of Economic Policy, University of Hannover. An earlier version of this chapter is available as Discussion Paper No. 586 of the

Hannover Economic Papers series.

Chapter 3 is co-authored with Andreas Wagener, Institute of Economic Policy, University of Hannover. An earlier version of this chapter is available as CESifo Working Paper No. 4838. It was presented at the Conference on Public Economics of Inequality (Berlin, Germany), the 70th Annnual Congress of the International Institute of Public Finance (Lugano, Switzerland), and the 6th Society for the Study of Economic Inequality Meeting (Luxembourg, Luxembourg). A poster summarizing this chapter was presented at Herrenhausen Conference "Re-Thinking Social Inequality" (Hannover, Germany).

Chapter 4 is co-authored with Andreas Wagener, Institute of Economic Policy, University of Hannover. This chapter is forthcoming in the Socio-Economic Review and is available via https://doi.org/10.1093/ser/mwx036. Publication within this thesis with kind permission of Oxford University Press. An earlier version of this chapter is available as ECINEQ Working Paper 2016 - 389.

This thesis ends with Chapter 5. An earlier version of this chapter is available as Discussion Paper No. 621 of the Hannover Economic Papers series.

# 2 The income distribution of voters: a case study from Germany[1]

## 2.1 Introduction

In most democratic countries, voter turnout in elections and socio-economic status are positively correlated: individuals with higher incomes, greater wealth and better education are significantly more likely to cast their vote than less advantaged citizens (DeNardo, 1980; Gallego, 2010; Mueller and Stratmann, 2003; Powell Jr., 1980; Verba and Nie, 1972; Verba et al., 1978). This stylized fact calls into question the democratic ideal that all citizens have equal weight in the polity: systematic differences in the participation in elections across socio-economic groups may result in inequalities in representation and influence (Lijphart, 1997), potentially biasing policy outcomes in favor of more privileged citizens and against the interests of low socio-economic status individuals.

In fact, prominent models in political economy posit a link between participation in elections and policies. Median voter approaches, for example, predict that government expenditures, progressive taxation or redistribution in a democracy vary with the gap between the income of the median voter and the mean income in the population (Meltzer and Richard, 1981) or, more generally, with the concentration of incomes around the mean (Acemoglu et al., 2015). If – for example, due to differential participation in elections – the median voter shifts towards poorer [richer] segments of society, redistribution increases [is reduced].

Numerous empirical studies try to identify the relationship between voter turnout and distribution-sensitive policy variables such as post-tax inequality, the amount of redistribution or the size of the government (Galbraith and Hale, 2008; Lupu and Pontusson, 2011;

[1] This chapter is co-authored with Andreas Wagener, Institute of Economic Policy, University of Hannover. An earlier version of this chapter is available as Discussion Paper No. 586 of the Hannover Economic Papers series.

Mahler, 2008; Mahler et al., 2014; Pontusson and Rueda, 2010; Rosema, 2007; Solt, 2010). Some studies run multiple-election regressions, relating turnout to policy outcomes. Other studies use (cross-sample) questionnaires to simulate individual and/or aggregate candidate or party choices that might have arisen with a higher or more uniform turnout (Lutz and Marsh, 2007). With either approach and notwithstanding some observations suggesting that a higher voter turnout goes along with a larger volume of government activities (Fumagalli and Narciso, 2012; Mueller and Stratmann, 2003), the overall evidence is mixed, inconsistent or weak (see, e.g., Acemoglu et al., 2015; Lutz and Marsh, 2007; Petterson and Rose, 2007; Rosema, 2007).

The lack of robust findings may indicate that, in the aggregate, voters and the general population (and, by implication, non-voters) actually do not differ that much from one another. In this note, we provide a small piece of evidence into that direction. Using the 2013 general election to the German Bundestag (the federal parliament in Germany) as an example, we compare the distribution of incomes among (self-reported) voters with the income distribution in the entire franchised population. In that election, as in many others, participation rates were monotonically increasing in income, suggesting a pro-rich, anti-poor bias for eventual policies. Still, the (normal and generalized) Lorenz curves as well as related inequality measures for the income distributions of voters and the population do not differ in a statistically significant way. To the extent that the income distribution in the population matters for actual policies, we do not detect any hint that the non-uniform election turnout distorts the majority will of society.

## 2.2 Population, voters and turnout

The calculation of income distributions is based on the 2013 wave of the German Socio-Economic Panel (G-SOEP). We use monthly net incomes (on household level), measured in Euro values of 2013 and equivalised according to the modified OECD scale. The G-SOEP is representative for the German income distribution up to the top one percent but lacks information on individuals at the very top (Jenderny and Bartels, 2015). Thus, we dropped the highest percentile and assume that 99%-percentile is the upper bound of the distribution. This truncation does not change results qualitatively (and even quantitative changes in differences are small).[2]

From the G-SOEP v31 sample, we select all 22,735 individuals, aged 18 or older, who

[2] As we ignore the top one percent and our calculation of inequality measures is based on classed data, our observations are conservative.

provided information on their incomes and did not belong to the top one percent of income earners. By the 'general income distribution' we denote the income distribution of this G-SOEP population, for brevity henceforth referred to as 'the population'. We compare the general income distribution to that of voters.[3]

As 'voters' we refer to everybody in the population who said that they had voted in the 2013 Bundestag election. G-SOEP v31 contained a question on participation in the election. A total of 15,520 respondents answered it, with 12,994 (= 83.72%) claiming that they actually had voted. This turnout among respondents is higher than the official turnout of 71.5%, reflecting the well-known feature that voting is overestimated in population surveys with self-reporting (Blais, 2000).

In what follows, we collapse data from the individual level to the vingtile level (see Section 2.4 for results based on the individual level). Table 2.1 reports turnout rates in the 2013 election to Bundestag by vingtile as well as the number of respondents answering the election question (the $N_{respondents}$ sum up to 15,520). In line with observations from many other elections around the world, turnout rates do indeed increase with income.

Table 2.1: Voter turnout by vingtile (election to Bundestag, 2013)

| vingtile | voter turnout | $N_{respondents}$ | vingtile | voter turnout | $N_{respondents}$ |
|---|---|---|---|---|---|
| 5% | 0.615 | 569 | 55% | 0.867 | 481 |
| 10% | 0.658 | 730 | 60% | 0.869 | 960 |
| 15% | 0.683 | 543 | 65% | 0.880 | 851 |
| 20% | 0.745 | 891 | 70% | 0.897 | 631 |
| 25% | 0.752 | 418 | 75% | 0.872 | 757 |
| 30% | 0.738 | 768 | 80% | 0.905 | 958 |
| 35% | 0.825 | 830 | 85% | 0.922 | 936 |
| 40% | 0.820 | 1106 | 90% | 0.932 | 876 |
| 45% | 0.827 | 579 | 95% | 0.937 | 933 |
| 50% | 0.851 | 851 | 100% | 0.947 | 852 |

We compare the income distributions (in vingtiles) of the population and of voters. For each vingtile we calculate the vingtile mean, based on the general income distribution. In the general income distribution, all vingtiles naturally have the same sample weight of $\frac{1}{20}$; for the voters' income distribution, sample weights are the probability to draw a certain income

[3] Rather than the general income distribution one might prefer to use the income distribution of the electorate as a baseline. In Bundestag elections, every German citizen aged 18 years or more is eligible to vote (with very few exceptions for long-term non-residents). The G-SOEP asked about citizenship, but 8% of the respondents chose not to answer this question, leaving us with some imprecision when identifying the electorate. As a robustness check (available on request), we ran our analysis using (self-reported) German citizens as the population. This does not change our results qualitatively – and even the quantitative differences are quite tiny.

under the condition that it belongs to a voter. By Bayes' Rule,

$$P(Vingtile_i|Voter) = \frac{P(Voter|Vingtile_i) \cdot P(Vingtile_i)}{P(Voter)} = \frac{1}{20} \cdot \frac{\text{turnout in vingtile } i}{\text{overall turnout}}$$

for $i = 1, \ldots, 20$. We report these weights in column 'weight voter' in Table 2.A1.

## 2.3 Comparing general and voters' income distributions

### 2.3.1 Means, medians and their ratios

Table 2.2 reports the mean incomes, the median incomes (both in Euro) and the mean-to-median ratios for the population's and the voters' income distribution. The latter ratio plays a crucial role for the predictions in median-voter frameworks of (direct) democracy such as Meltzer and Richard (1981).

Table 2.2: Various mean-to-median ratios

| | |
|---|---|
| mean income, general | 1719 |
| median income, general | 1507 |
| mean-to-median ratio, general | 1.141 |
| | |
| mean income, voters | 1804 |
| median income, voters | 1573 |
| mean-to-median ratio, voters | 1.147 |

*Incomes in Euro. Source: Own calculations for 2013 based on SOEP v31.*

On average, voters have higher incomes than the population. The difference in mean incomes is statistically significant at the 1% level ($t$-test). The (positive) difference in median incomes is, however, not statistically significant (Mann-Whitney test). The ratio between the incomes of the average income earner and the median does not differ between voters and the population either, implying, for this example, that a majority voting equilibrium in the model by Meltzer and Richard (1981) and its kindred would not be affected by income-differentiated turnouts.

### 2.3.2 Lorenz curves

The gap between mean and median incomes is a non-standard measure of income inequality. Common measures build on Lorenz curves. We therefore estimated Lorenz curves using linear interpolations within vingtiles, as proposed by Jann (2016). Estimation using sample survey data means that estimates reflect sampling variability. As Lorenz curves and other inequality measures are nonlinear functions of the observations, conventional methods for variance estimation cannot be applied (Kovacevic and Binder, 1997). Instead approximate (linear) estimation techniques can be used (Jann, 2016).

Graphs of the estimated Lorenz curves are presented in Figure 2.1. Estimated Lorenz curves and corresponding 95% confidence intervals are presented in Figure 2.A1 in the Appendix.

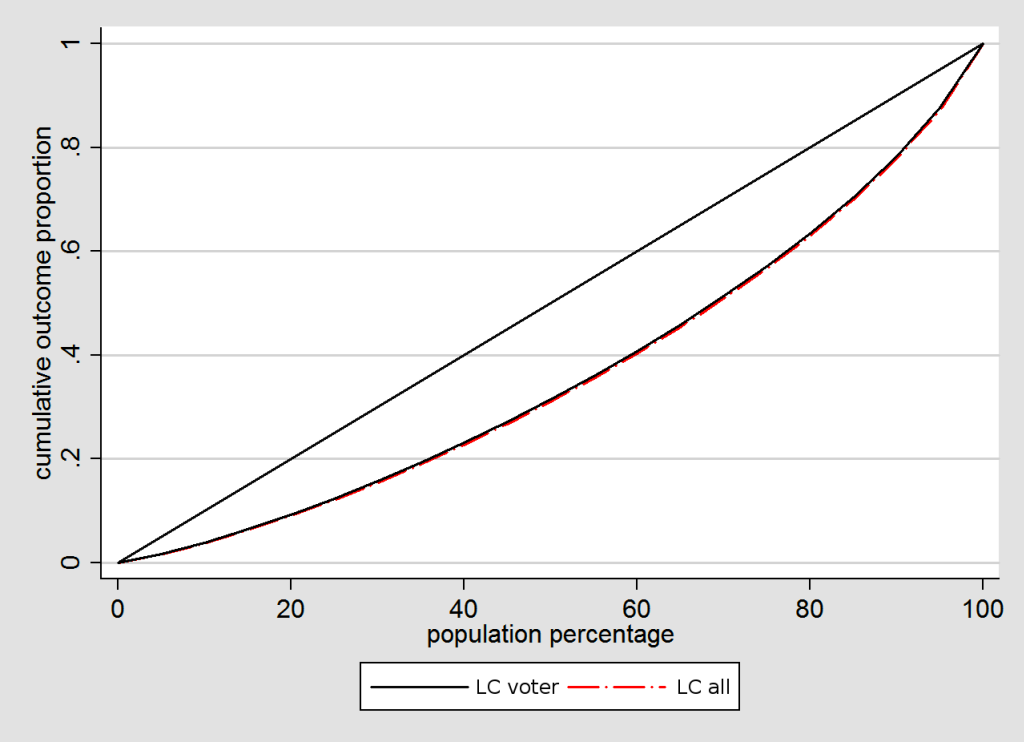



Figure 2.1: Lorenz curves, voters and general.

Though a bit difficult to visualize, the estimated Lorenz curve for voters' incomes entirely lies above of that of the population. Due to their overlapping confidence intervals (see Figure 2.A1) we still cannot rank the two distributions with respect to the criterion of Lorenz dominance in a statistically reliable way.

Despite the unequal means in the income distributions of voters and the population, the same holds for the Generalized Lorenz curves: neither distribution dominates the other; see

Table 2.A2 in the Appendix. In summary, no clear-cut inequality ranking of voters and the population is possible.

### 2.3.3 Inequality measures

Various inequality measures are transformations of the Lorenz curve, allowing for restricted inequality comparisons even when Lorenz dominance does not prevail. Table 2.3 compares some measures for voters and the general German population in 2013.

Table 2.3: Comparison of different inequality measures

| | voters | | general | |
|---|---|---|---|---|
| | Coeff. | Std. Err. | Coeff. | Std. Err. |
| Gini coefficient | 0.270 | 0.041 | 0.276 | 0.042 |
| $GE(-1)$: Gen. entropy with $\alpha = -1$ | 0.133 | 0.045 | 0.140 | 0.047 |
| $GE(0)$: Mean log deviation | 0.119 | 0.036 | 0.124 | 0.038 |
| $GE(1)$: Theil index | 0.118 | 0.036 | 0.125 | 0.038 |
| $GE(2)$: half std. dev./mean | 0.131 | 0.043 | 0.139 | 0.046 |
| Atkinson index with $\varepsilon = 0.5$ | 0.058 | 0.017 | 0.060 | 0.018 |
| Atkinson index with $\varepsilon = 1$ | 0.112 | 0.032 | 0.117 | 0.034 |
| Atkinson index with $\varepsilon = 2$ | 0.210 | 0.056 | 0.218 | 0.058 |

*$GE(\alpha)$ denotes the Generalized Entropy index with distance weight $\alpha$; $\varepsilon$ denotes the parameter of inequality aversion in the Atkinson index. Source: Own calculations for 2013 based on SOEP v31.*

While all point measures suggest that inequality is lower among voters than in the general population, none of these differences is statistically significant (we applied $t$-tests, as recommended by Cowell and Flachaire (2015)). In sum, we do not detect statistically significant differences between the general income distribution and the distribution of voters' incomes.

## 2.4 Robustness check: individual-level data

As an alternative to using vingtile-level sample weights for approximating the income distribution of voters we also calculated the distribution based on individual-level data. In the voter sample, individuals are weighed such that the share of every income vingtile equals the actual share of voters from our sample in that vingtile. Changing from vingtiles to individual observations increases the number of observations drastically, causing the estimated variances of coefficients to decrease correspondingly. Again, we truncate the distribution at the top percentile.

Lorenz curves of voters and the population are presented in Figure 2.2. Again, one cannot rank the two distributions with respect to Lorenz dominance.

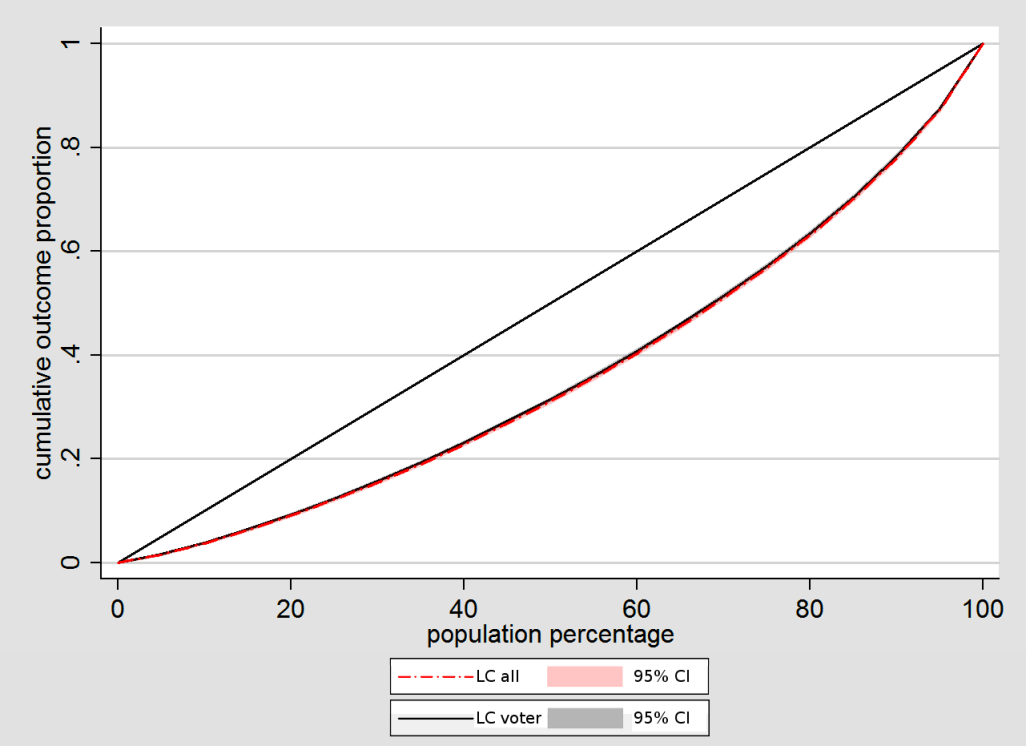



Figure 2.2: Both Lorenz curves (individual-level weights).

Table 2.A3 in the Appendix reports the means, the medians and their ratio in the income distributions of population and voters.[4] The differences in the mean and median incomes between voters' and the population are nearly the same. The difference in mean incomes is statistically highly significant at the 1%-level.

Remarkably, the mean income in the population and the median voter's income is close to parity – which, in the Meltzer-Richard framework, would indicate that there is no majority support for (additional) redistribution.

Table 2.A4 reports inequality measures; it is the individual-level equivalent to Table 2.3. Again, none of the differences in inequality measures is statistically significant different from zero.

All in all, also with individual-level data we do not find statistically significant differences between voters' and the population's income distributions or their inequality measures.

[4]The differences between Table 2.A3 and Table 2.2 in the values for the total population are due to the fact that values in Table 2.2 refer to vingtile mean incomes and not to individual-level data.

## 2.5 Conclusions

Differences in turnout across socio-economic groups may be problematic for the democratic legitimacy and representativeness of parliaments and governments. However, differential turnouts do not necessarily matter materially in the sense that election outcomes or implemented policies would be different with more uniform participation. Recent evidence seems to point precisely into such direction of 'irrelevance' (Rosema, 2007).

This note adds a piece of evidence from Germany. Although *prima facie* looking different, the income distributions of voters and the population in the 2013 federal elections do not differ in a statistically significant way. Provided that the income distribution in the entire population matters for actual policies, we do not find any indication that the election turnout distorts the 'true' majority will of society.

Several caveats must be mentioned. We studied just one election in Germany, limiting the generality of our observation. We only looked at differences in the distributions of incomes between voters and non-voters. All potential implications for (counter-factual) policy outcomes thus, depend, on how politically relevant citizens' incomes or their inequality are. The (ir-)relevance of other characteristics (such as education, ethnicity, ideology, age etc.) also needs to be scrutinized. We implicitly hypothesized that turnout shapes policies; the causality might, however, also run the other way round. Finally, as suffrage in German federal elections is for German citizens only, the income distribution in the population need not fully reflect that of the entire society.

## 2.6 Appendix

Table 2.A1: Comparison of sample weights

| vingtile | mean income | equal weight | cum. equal weight | weight voter | cum. weight voter |
|---|---|---|---|---|---|
| 1 | 530 | 0.05 | 0.05 | 0.037 | 0.037 |
| 2 | 753 | 0.05 | 0.1 | 0.040 | 0.077 |
| 3 | 863 | 0.05 | 0.15 | 0.041 | 0.118 |
| 4 | 971 | 0.05 | 0.2 | 0.045 | 0.163 |
| 5 | 1047 | 0.05 | 0.25 | 0.045 | 0.209 |
| 6 | 1122 | 0.05 | 0.3 | 0.045 | 0.253 |
| 7 | 1210 | 0.05 | 0.35 | 0.050 | 0.303 |
| 8 | 1308 | 0.05 | 0.4 | 0.050 | 0.353 |
| 9 | 1385 | 0.05 | 0.45 | 0.050 | 0.403 |
| 10 | 1475 | 0.05 | 0.5 | 0.051 | 0.454 |
| 11 | 1539 | 0.05 | 0.55 | 0.052 | 0.507 |
| 12 | 1632 | 0.05 | 0.6 | 0.053 | 0.559 |
| 13 | 1755 | 0.05 | 0.65 | 0.053 | 0.612 |
| 14 | 1883 | 0.05 | 0.7 | 0.054 | 0.667 |
| 15 | 1995 | 0.05 | 0.75 | 0.053 | 0.719 |
| 16 | 2153 | 0.05 | 0.8 | 0.055 | 0.774 |
| 17 | 2398 | 0.05 | 0.85 | 0.056 | 0.830 |
| 18 | 2703 | 0.05 | 0.9 | 0.056 | 0.886 |
| 19 | 3192 | 0.05 | 0.95 | 0.057 | 0.943 |
| 20 | 4451 | 0.05 | 1 | 0.057 | 1.000 |

*Notes:* A $\chi^2$-test for equality of distributions shows no statistically significant difference between the distribution of weight_voter and the uniform distribution with weight $1/20$ of each vingtile.

Table 2.A2: Estimated Generalized Lorenz curves

| | general | | | | voters | | | |
|---|---|---|---|---|---|---|---|---|
| pop. share | Coeff. | Std. Err. | 95% Conf. Int. | | Coeff. | Std. Err. | 95% Conf. Int. | |
| 0 | 0 | . | . | . | 0 | . | . | . |
| 5 | 26.5397 | . | . | . | 29.3999 | 6.7228 | 15.3289 | 43.4709 |
| 10 | 64.2332 | 11.1538 | 40.8879 | 87.5784 | 69.6233 | 11.1865 | 46.2097 | 93.0369 |
| 15 | 107.4157 | 17.2482 | 71.3148 | 143.5166 | 116.2165 | 17.2306 | 80.1525 | 152.2805 |
| 20 | 155.9684 | 24.2403 | 105.2329 | 206.7039 | 167.5603 | 22.6161 | 120.2243 | 214.8964 |
| 25 | 208.3219 | 29.6825 | 146.1958 | 270.4480 | 223.0201 | 28.1504 | 164.1006 | 281.9395 |
| 30 | 264.4397 | 35.4211 | 190.3025 | 338.5770 | 283.2631 | 34.6139 | 210.8153 | 355.7109 |
| 35 | 324.9795 | 42.5679 | 235.8838 | 414.0752 | 348.3770 | 42.3294 | 259.7805 | 436.9736 |
| 40 | 390.4091 | 50.8690 | 283.9390 | 496.8792 | 417.4500 | 48.7904 | 315.3304 | 519.5695 |
| 45 | 459.6981 | 57.5450 | 339.2551 | 580.1411 | 490.9689 | 56.1422 | 373.4619 | 608.4759 |
| 50 | 533.4673 | 65.3167 | 396.7579 | 670.1767 | 567.6647 | 61.5373 | 438.8658 | 696.4637 |
| 55 | 610.4341 | 70.7636 | 462.3242 | 758.5440 | 648.6669 | 68.7747 | 504.7198 | 792.6141 |
| 60 | 692.0553 | 78.4977 | 527.7579 | 856.3528 | 735.2957 | 78.2701 | 571.4746 | 899.1169 |
| 65 | 779.8107 | 88.5245 | 594.5269 | 965.0945 | 827.8926 | 88.3864 | 642.8978 | 1012.8870 |
| 70 | 874.0009 | 98.7249 | 667.3673 | 1080.6340 | 925.8082 | 97.4201 | 721.9056 | 1129.7110 |
| 75 | 973.7691 | 107.0080 | 749.7988 | 1197.390 | 1030.4230 | 107.8508 | 804.6886 | 1256.1570 |
| 80 | 1081.4360 | 117.7713 | 834.9375 | 1327.9340 | 1144.4600 | 122.3115 | 888.4592 | 1400.4610 |
| 85 | 1201.3680 | 132.9974 | 923.0009 | 1479.7340 | 1270.5560 | 140.1038 | 977.3152 | 1563.7970 |
| 90 | 1336.5320 | 149.4641 | 1023.7000 | 1649.3640 | 1412.5220 | 163.6479 | 1070.0030 | 1755.0410 |
| 95 | 1496.1790 | 170.6649 | 1138.9730 | 1853.3840 | 1581.2920 | 217.1728 | 1126.7440 | 2035.8400 |
| 100 | 1718.7570 | 208.0124 | 1283.3820 | 2154.1320 | 1803.8700 | 217.1728 | 1349.3220 | 2258.4180 |

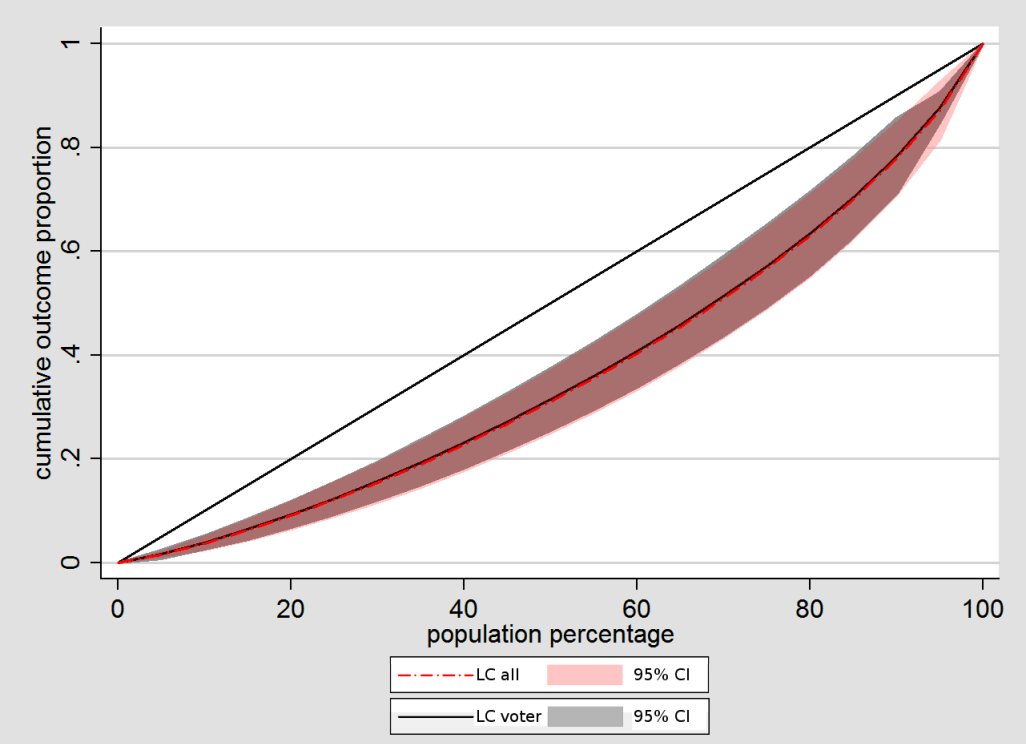



Figure 2.A1: Both Lorenz curves with 95% confidence intervalls.

Table 2.A3: Mean-to-median ratios (individual data)

| | |
|---|---|
| mean income, general | 1715 |
| median income, general | 1500 |
| mean-to-median ratio, general | 1.143 |
| | |
| mean income, voters | 1800 |
| median income, voters | 1565 |
| mean-to-median ratio, voters | 1.150 |

*Source: Own calculations for 2013 based on SOEP v31.*

Table 2.A4: Inequality measures (individual-level data)

| | voters | | general | |
|---|---|---|---|---|
| | Coeff. | Std. Err. | Coeff. | Std. Err. |
| Gini coefficient | 0.270 | 0.0013 | 0.276 | 0.0014 |
| $GE(-1)$: Gen. entropy with $\alpha = -1$ | 0.136 | 0.0015 | 0.144 | 0.0016 |
| $GE(0)$: Mean log deviation | 0.119 | 0.0012 | 0.125 | 0.0012 |
| $GE(1)$: Theil index | 0.119 | 0.0012 | 0.125 | 0.0013 |
| Atkinson index with $\varepsilon = 0.5$ | 0.058 | 0.0006 | 0.061 | 0.0006 |
| Atkinson index with $\varepsilon = 1$ | 0.113 | 0.0010 | 0.118 | 0.0011 |
| Atkinson index with $\varepsilon = 2$ | 0.214 | 0.0019 | 0.223 | 0.0020 |

*$GE(\alpha)$ denotes the Generalized Entropy index with distance weight $\alpha$; $\varepsilon$ denotes the parameter of inequality aversion in the Atkinson index. Source: Own calculations for 2013 based on SOEP v31.*

# 3 Biased perceptions of income inequality and redistribution[1]

## 3.1 Introduction

The relationship between income inequality and redistribution in democracies is puzzling (Kenworthy and Pontusson, 2005; Persson and Tabellini, 2000). The seminal political-economy approach by Meltzer and Richard (1981) and Romer (1975) predicts that greater inequality in the distribution of gross incomes leads to higher levels of redistribution in a majority-voting equilibrium. Higher levels of inequality – measured by the ratio of mean gross income to median gross income – imply that the politically decisive agents can gain more from, and consequently will demand for, more redistribution.

While theoretically convincing, the empirical performance of this prediction is mixed, at best (see Section 2). Given that the Meltzer-Richard (henceforth: MR) model entails a long chain of logical steps from the ex-ante inequality in incomes to the extent of redistribution in a political equilibrium, this need not be surprising. The logical steps encompass the validity of the median voter hypothesis (actual policies are the median voter's most preferred policy), the identity of median voter and median income earner, a purely materialistic and selfish attitude towards redistribution in a static framework, a direct link from voter preferences to policies, etc.

This paper suggests a complementary explanation why empirical tests of the MR hypothesis often appear to be inconclusive or negative: they use objective income distributions rather than perceived ones. 'Objective' refers to official data, which are meant to give a statistically accurate description of a country's income distribution; 'perceived' refers to how individuals view the income distribution and their position in it. There is ample of evidence – and we provide a further piece, too – that individuals hold erroneous beliefs about income in-

[1]This chapter is co-authored with Andreas Wagener, Institute of Economic Policy, University of Hannover. An earlier version of this chapter is available as CESifo Working Paper No. 4838. It was presented at conferences in Germany, Switzerland, and Luxembourg.

equality in their societies, typically underestimate its extent and consider themselves to be relatively richer than they really are (see Section 3.2). If preferences for redistribution are based on perceived income inequality, less redistribution should emerge in a majority voting equilibrium, compared to the equilibrium predicted from the true income distribution. Moreover, since misperceptions of income inequality might differ across countries, the inequality ranking of countries based on perceived distributions may differ from that based on true data.

The idea that perceptions rather than facts and data drive redistributive politics is not restricted to the MR hypothesis but can also be applied to other theories. A particularly fruitful extension of the MR framework is provided by the *Prospect of Upward Mobility* (POUM) hypothesis. It posits that people with below average incomes today might not support redistribution from rich to poor because they hope that they or their children will move upward on the economic ladder in the future where a more progressive tax system will hurt them (Benabou and Ok, 2001). It is well established that citizens hold distorted (generally: too optimistic) expectations of (their) upward social mobility (Bjoernskov et al., 2013). Political preferences and policies formulated on the ground of these expectations will then differ from those based on factual data.

In this paper we assess the MR hypothesis when based on perceptions of inequality. We use survey data from various waves of the International Social Survey Programme (ISSP) where individuals are asked to locate their own position in society on a range between 1 (poorest) and 10 (richest). From these self-assessments of relative positions we construct a perceived distribution of incomes with an attending mean-to-median ratio. It turns out that these perceived ratios are, for all countries and in all years of our sample, considerably below their true values, indicating a widespread underestimation of income inequality. Employing perceived inequality measures as explanatory variables for social expenditure, the MR hypothesis works fine empirically: a larger degree of perceived inequality goes along with a greater amount of redistribution, measured by social spending as a percentage of GDP. This observation survives all robustness checks to which we took it. Moreover, in international comparison, the stronger the misjudgment, i.e., the more benign the inequality situation in a country is viewed relative to the objective one, the lower are social expenditures.

In addition, we test a 'perceived version' of the POUM hypothesis. We rely on the ISSP question that asks individuals how important, on a range from 1 to 5, they find hard work to get ahead. In line with the literature we interpret the assignment of a greater importance to hard work as an indicator for a higher perceived social mobility. As a factual measure of upward social mobility we use the share of people in the ISSP who report that they actually are in higher occupations than their fathers. Regressing social expenditure on perceived and actual upward mobility, the former performs much better than the latter, both with respect to

the sign of the effect and its statistical significance.

Section 3.2 embeds our study into the extant literature. Section 3.3 presents our analysis of the MR hypothesis, describing data and methodology, results, and robustness checks. Section 3.4 does the same for the POUM hypothesis. Section 3.5 concludes. The Appendix collects information on data sources, variable definitions, supplementary regressions and robustness checks.

## 3.2 Related observations

Previous research by economists and political scientists tried to validate the Meltzer and Richard (1981) model empirically. Due to obvious endogeneity problems, causal identifications of the MR hypothesis so far do not exist. Moreover, the evidence resulting from the extant correlation studies is mixed. Some studies find the hypothesized positive link between inequality and redistribution (see, e.g., Borge and Rattsoe, 2004; Finseraas, 2009; Mahler, 2008; Meltzer and Richard, 1983; Milanovic, 2000), while others suggest a negative relationship (e.g., Georgiadis and Manning, 2012; Gouveia and Masia, 1998; Rodrìguez, 1999) or no significant link at all (e.g., Kenworthy and McCall, 2008; Larcinese, 2007; Lindert, 1996; Pecoraro, 2014; Pontusson and Rueda, 2010; Scervini, 2012; Tóth et al., 2011).

Rather than actual redistributive policies (often measured by social expenditure in percent of GDP), some studies correlate individual preferences ('demand') for redistribution with income inequality (see, e.g., Finseraas, 2009; Georgiadis and Manning, 2012; Kenworthy and McCall, 2008). For the MR hypothesis, the performance of such studies tends to be better than that of social quota-studies, suggesting that individuals in more unequal societies would like to see more redistribution. However, such stated preferences for redistribution might be regarded as cheap-talk; the link between voter preferences to actually implemented policies is still lacking. We therefore prefer to use policy outcomes as the dependent variable in a direct test of the MR hypothesis.

The studies differ in how they measure income inequality: by the ratio of mean to median income, the Gini coefficient, the income share of the 1% richest etc. However, almost all of studies (for exceptions, see below) evaluate the inequality measures they use with 'objective' data of the income distribution, obtained from statistical offices, the OECD, the LIS, or tax authorities. While factually accurate, these data and the picture of inequality they portray need not coincide with how citizens and voters themselves *perceive* the income distribution.

There are good reasons to assume that citizens hold distorted views on inequality. Experi-

ments show that respondents fail to determine their own position in the income scale (Cruces et al., 2013; Engelhardt and Wagener, 2017; Karadja et al., 2017). Furthermore, they underestimate income inequality per se. Norton and Ariely (2011) observe considerable discrepancies between actual and perceived levels of inequality in wealth in the US: citizens view the wealth distribution vastly more equal than it actually is. Similarly, Osberg and Smeeding (2006) show that estimated disparities between the earnings of different occupational groups are much smaller than actual differences, suggesting again an underestimation of income inequality. Bartels (2005, 2008) argues that knowledge about inequality in the U.S. is not only low but also shaped by political ideology, with conservatives [liberals] being less [more] aware of the rising inequality, even after controlling for their level of general political knowledge. Using a variety of cross-national surveys, Gimpelson and Treisman (2015) show that the general public knows quite little about inequality in their countries. As a tendency, there seems to be an underestimation of wage inequality while income inequality and poverty are overrated.

Sociologists have since long established that individuals systematically underestimate the extent of inequality. This occurs mainly due to the failure to locate their own position in the income distribution (also see, e.g., Engelhardt and Wagener, 2017; Gimpelson and Treisman, 2015, and Section 3.3.3 below). Several reasons may account for such incorrect self-positioning, ranging from limited availability of social comparisons – which leads individuals to falsely believe that they are close to the average income earner (Evans and Kelley, 2004; Runciman, 1966) – to so-called *self-enhancement biases* – individuals are inclined to see their own (income) position rosier and relatively better than it actually is (generally see, e.g., Guenther and Alicke, 2010). Such misperceptions generally invoke an underestimation of (income) inequality.

Inequality is not the only economically relevant variable that is subject to biased perceptions. For the public sphere, divergences between subjective perceptions and more objective measures have been observed in the very different contexts of inflation (Gärling and Gamble, 2008), general economic performance (Duch et al., 2000), corruption (Olken, 2009), tax rates (Fujii and Hawley, 1988), teacher performance (Jacob and Lefgren, 2008), and social mobility (Bjoernskov et al., 2013); on the latter, see our discussion of the POUM hypothesis in Section 3.4.

Systematic misperceptions matter for voting. Conceptually, theories of (economic) voting depend on the notion of voters' perceived state of the world, rather than on any 'true' or measured state (Stevenson and Duch, 2013). Empirically, voters' perceived states of the world are not simply zero-mean noise around some true state of the world (such that their effect on votes would cancel out in the aggregate). Rather, they entail cognitive biases, salience

issues, ideological preferences etc. that systematically distort away the distribution of expressed political preferences from the one that emerged with full and accurate knowledge (Althaus, 1998; Bartels, 1996, 2008; Caplan, 2007).

In that spirit, a few studies on the political economy of redistribution have recently started to substitute objective measures of inequality by perceived ones. Kenworthy and McCall (2008) measure perceived inequality by the perceived relative wage difference between a high-paying occupation and lesser-paying occupations, thus proxying decile ratios. In their mainly explorative analysis, they do not find any relationship between (changes in) income redistribution and (changes in) perceived inequality. A potential drawback of their measure of perceived inequality is, however, that it does not take into account possible biases from an incorrect self-positioning, which is an important driver of misperceptions. Niehues (2014) looks at ISSP respondents' beliefs about the *type* of society (out of five possible ones) they are living. Types are visualized by pyramid- to rhomb-shaped graphs, representing the composition of strata in society. In countries where the composition is perceived to be of a lesser equalized type the demand for redistribution is then found to be greater. Strikingly, when comparing the respondents' assessments of their country type with the 'true' type, inequality is found to be *overestimated* in some European countries. Gimpelson and Treisman (2015) show that measures of perceived inequality, calculated from the geometric visualizations of types of income distributions in the ISSP, correlate much more strongly than measures based on official data with the perceived tensions between rich and poor. Differences in findings may be explained by the fact that Niehues (2014) and Gimpelson and Treisman (2015) construct a measure of perceived inequality based on the chosen graphs representing social stratification while we define a numerical measure mainly driven by a self-positioning bias. This suspicion is also supported by Engelhardt and Wagener (2017). In this study a representative sample of the german population were asked about their perception of their own relative income rank and about the type of society which - in their opinion - best describes the german society today. Respondents - on average - fail to locate their own position in the income distribution. The pattern of bias found in the survey is similar to the pattern observed in this study and to the pattern found by Cruces et al. (2013) suggesting an underestimation of inequalty. But biases in social stratification perceptions go in the same direction as found by Niehues (2014).

Bredemeier (2014) theoretically discusses determinants of rising inequality that can account for a lower demand for redistribution. The paper argues that when the incomes of the poor increase, perceived inequality decreases (even though the mean-to-median ratio might actually increase) and the demand for redistribution goes down. This theoretical result is in line with our empirical observation that political outcomes based on expectations will differ from

those based on factual data.

The POUM hypothesis has mainly been tested with respect to preferences for redistribution. Corneo and Grüner (2002) show that the degrees both of perceived social mobility (based on a 'hard work'-question in social surveys) and of experienced social mobility (based on the comparison to one's father's job) weaken the support for the statement that governments should reduce inequalities. However, this is again more a statement on inequality aversion than on political outcomes. The dependent variable in Alesina and La Ferrara (2005) is more specific (agreement with the statement that 'the government should reduce income differences between the rich and the poor'). Interestingly, in this study all measures of perceived social mobility are negatively correlated with the support of more redistribution, while most measures of experienced upward mobility show no association with the desire for larger social spending. In Section 3.4 we will show that this also holds for actual (rather than desired) redistribution.

## 3.3 The MR hypothesis and perceived inequality

### 3.3.1 Data and descriptive statistics

The International Social Survey Program (ISSP) is a continuous cross-national survey which contains questions covering a variety of social science topics[2] and it provides the best available comparative data on public opinion regarding inequality and redistribution (Brooks and Manza, 2006; Kenworthy and McCall, 2008; Lübker, 2006; Osberg and Smeeding, 2006). Using the ISSP, we design a new measure of perceived inequality in the income distribution. The measure is based on the following survey question:

> 'In our society there are groups which tend to be towards the top and groups which tend to be toward the bottom. Below is a scale that runs from top to bottom (vertical scale (10 top – 1 bottom)). Where would you put yourself now on this scale?'

Data on the answers are available for the years 1987, 1992, 1999 and 2006-2009 for 26 OECD countries covered on the ISSP.[3] The ISSP does not include all 26 countries in each wave. For some countries we just have one single observation. Thus, we decided to base

[2] See http://www.gesis.org/issp/home/ for more information about the ISSP.

[3] These are: Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, UK, and the US.

our main analysis on cross-sectional data. This enables us to use information from all 26 countries. Table 3.A1 in the Appendix shows from which country in which wave all required data are available. We will discuss the possibility of a pooled sample specification in Section 3.3.3. Survey data from the ISSP exhibit a representative cross section of societies and the calculated perceived inequality measures are based on information of 161,438 individuals which respond to the top-bottom-question[4].

The histograms (relative frequencies) for the average answers to the question quoted above are depicted country-by-country in Figure 3.1. The distributions in Figure 3.1 exhibit a remarkable degree of symmetry[5] (sometimes even left-skewedness). Compared to the marked right-skewedness of actual income distributions this suggests that the inequality situation is systematically misperceived by the public. In line with the findings in Cruces et al. (2013) and Engelhardt and Wagener (2017), poor people tend to overestimate their rank while rich people tend to underestimate it.

We assume that self-assessments are mainly made in terms of income and, thus, provide an approximation of the perceived position in the income distribution. To check whether respondents of the ISSP question indeed associated somewhat loose terms such as 'groups in society', 'towards the top' or 'towards the bottom' in accordance with their views on income strata, we calculate the individual misperception of the own rank by subtracting a person's actual income decile from her perceived position. There is, in general, a strong positive association between actual income position[6] and perceived rank. As Table 3.1 shows additionally, individuals below the fifth decile tend to overestimate their rank while individuals above the fifth decile tend to underestimate it. Respondents in the fifth decile quite accurately positioned themselves at quantile 5.335 ($5 + constant$) on average. By contrast, respondents in the third and seventh decile on average put themselves at, respectively, 4.927 and at 5.675. As in Cruces et al. (2013), the severity of misjudgments increases with the distance to the center of the distribution.

The hypothetical income distributions in Figure 3.1 are based on the aggregation of individual and categorical data. They are, thus, not perceptions of the income distribution that any specific individual in society holds but rather a summary view on how society categorizes itself with respect to inequality. We can overlook this fact, because we are interested

[4]The number of oberservations in our cross-sectional data set ranges from 1,247 in Belgium to 10,960 in Germany.

[5]We cannot exclude the possibility that the kind of question fosters this symmetric pattern of answers. The answer categories may suggest a symmetric distribution of incomes. But, in political discussions concerning income distributions a symmetric formulation is also usual (e.g. lower, middle, and upper class) with the - potentially - same implication.

[6]For perceived own relative income it does not matter whether resondents think about net or gross incomes. Progressive tax-transfer-systems in OECD countries are not excessive enough to change pattern of society.

Table 3.1: Biases per income decile

| | Coeff. | Std. Err. |
|---|---|---|
| 1. decile | 2.934*** | 0.045 |
| 2. decile | 2.280*** | 0.045 |
| 3. decile | 1.592*** | 0.045 |
| 4. decile | 0.739*** | 0.045 |
| 5. decile | reference | |
| 6. decile | -0.852*** | 0.045 |
| 7. decile | -1.660*** | 0.045 |
| 8. decile | -2.459*** | 0.045 |
| 9. decile | -3.422*** | 0.045 |
| 10. decile | -4.97*** | 0.046 |
| constant | 0.335*** | 0.032 |
| $R^2$ | 0.6698 | |
| $N$ | 28401 | |

*Notes:* Robust standard errors in parentheses: $***p < 0.01$, $**p < 0.05$, $*p < 0.1$. Estimations are exemplary and figures are based on data from 2009. Results do not change qualitatively if we use other years or cross-sectional data. Data for Canada, Mexico, and the Netherlands are missing here.

in validating the Meltzer-Richard Hypothesis. According to the MR hypothesis, the tax rate most preferred by the median income earner will win the voting. The higher the median perception of own relative income in society, the lower is the preferred tax rate and the less redistribution will take place, compared to the voting outcome based on accurate knowledge.

To approximate the bias in perception, we compare the perceived mean-to-median ratio (the ratio between the average and the median value of self-categorizations) and the actual one, calculated from OECD statistics. Both are reported in Table 3.2. To capture the relative degree of misperception we form the ratio of the perceived mean-to-median ratio and the actual ratio. We call this measure the 'weighted perception' of income inequality:

$$\text{weighted perception} := \frac{\text{mean-to-median (perceived)}}{\text{mean-to-median (actual)}}, \tag{3.1}$$

which Table 3.2 reports as well.

Table 3.2 entails three remarkable observations:

- The actual mean-to-median ratios are uniformly greater than the perceived ones, indicating that inequality is underestimated everywhere. Correspondingly, the measure

Table 3.2: Mean-to-median ratio and misjudgment

| | official | perceived | weighted perception |
|---|---|---|---|
| Austria | 1.116 | 1.065 | 0.954 |
| Belgium | 1.088 | 0.993 | 0.912 |
| Canada | 1.141 | 1.022 | 0.895 |
| Chile | 1.656 | 0.984 | 0.594 |
| Czech Republic | 1.132 | 1.076 | 0.951 |
| Denmark | 1.068 | 1.004 | 0.940 |
| Finland | 1.080 | 0.986 | 0.914 |
| France | 1.159 | 1.003 | 0.865 |
| Germany | 1.131 | 1.039 | 0.919 |
| Ireland | 1.170 | 1.066 | 0.912 |
| Italy | 1.138 | 1.003 | 0.881 |
| Japan | 1.144 | 0.985 | 0.861 |
| Mexico | 1.480 | 0.912 | 0.616 |
| Netherlands | 1.156 | 0.966 | 0.836 |
| New Zealand | 1.178 | 1.010 | 0.857 |
| Norway | 1.077 | 1.017 | 0.945 |
| Poland | 1.171 | 1.036 | 0.885 |
| Portugal | 1.265 | 1.099 | 0.869 |
| Slovenia | 1.077 | 1.063 | 0.986 |
| South Korea | 1.105 | 0.912 | 0.825 |
| Spain | 1.137 | 1.046 | 0.920 |
| Sweden | 1.078 | 1.023 | 0.949 |
| Switzerland | 1.149 | 0.951 | 0.828 |
| Turkey | 1.344 | 0.847 | 0.630 |
| UK | 1.210 | 1.141 | 0.944 |
| US | 1.192 | 1.043 | 0.875 |

*Notes:* Authors' calculations based on cross-sectional data (1987-2009). Official mean-to-median ratios are based on OECD Database, perceived mean-to-median ratios are based on ISSP data. Years are only included, if they are available for both measures.

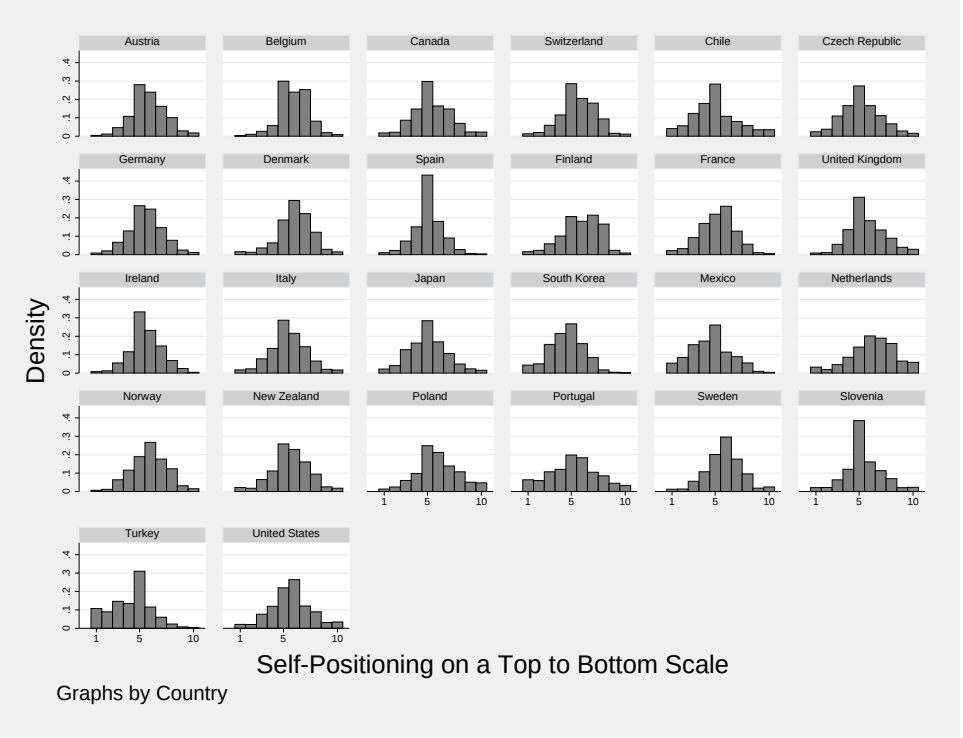



Figure 3.1: Generated perceived distributions based on cross-sectional data.

of weighted perceived inequality only takes values below 1. Its range from 0.986 to 0.594 evidences that inequality is underestimated to a quite considerable degree.

- The underestimation of inequality tends to be more pronounced in countries with higher actual inequality: the coefficient of correlation between actual and perceived mean-to-median ratios is $-0.36$.[7]

- In spite of this correlation, the country rankings with respect to actual and perceived mean-to-median income ratios differ widely: the rank correlation coefficient is very low at $-0.06$.

The low correlation can be explained by different patterns of bias between low and high income groups. The relatively poor tend to overestimate their relative income while the relatively rich underestimate their income rank as can be seen in Table 3.1. The net result - whether the bias of the poor overrides the bias of the rich or vice versa - is not predictable and differs between countries.

[7] A possible explanation for this observation might be a 'just-world' effect: people want to perceive the world as fair, which necessitates that they hold larger biases the less fair the world actually is. See Trump (2014) for a related observation in an experimental study.

Table 3.2 is based on cross-sectional data. Table 3.A1 in the Appendix reports the weighted perceived inequality measure per survey wave in the ISSP, corroborating the widespread underestimation of inequality for every period.

### 3.3.2 Empirical results

Figure 3.2 provides first insights into the relationship between social spending and the inequality measures reported in Table 3.2. Social spending includes all public social expenditures measured as percentag of GDP and is taken from the OECD Social Expenditure Database (SOCX). Plotting social expenditure against actual and perceived inequality in different countries shows a negative correlation between social expenditures and actual inequality (left panel), while social expenditure and the perceived inequality (middle and right panel) exhibit a positive association.

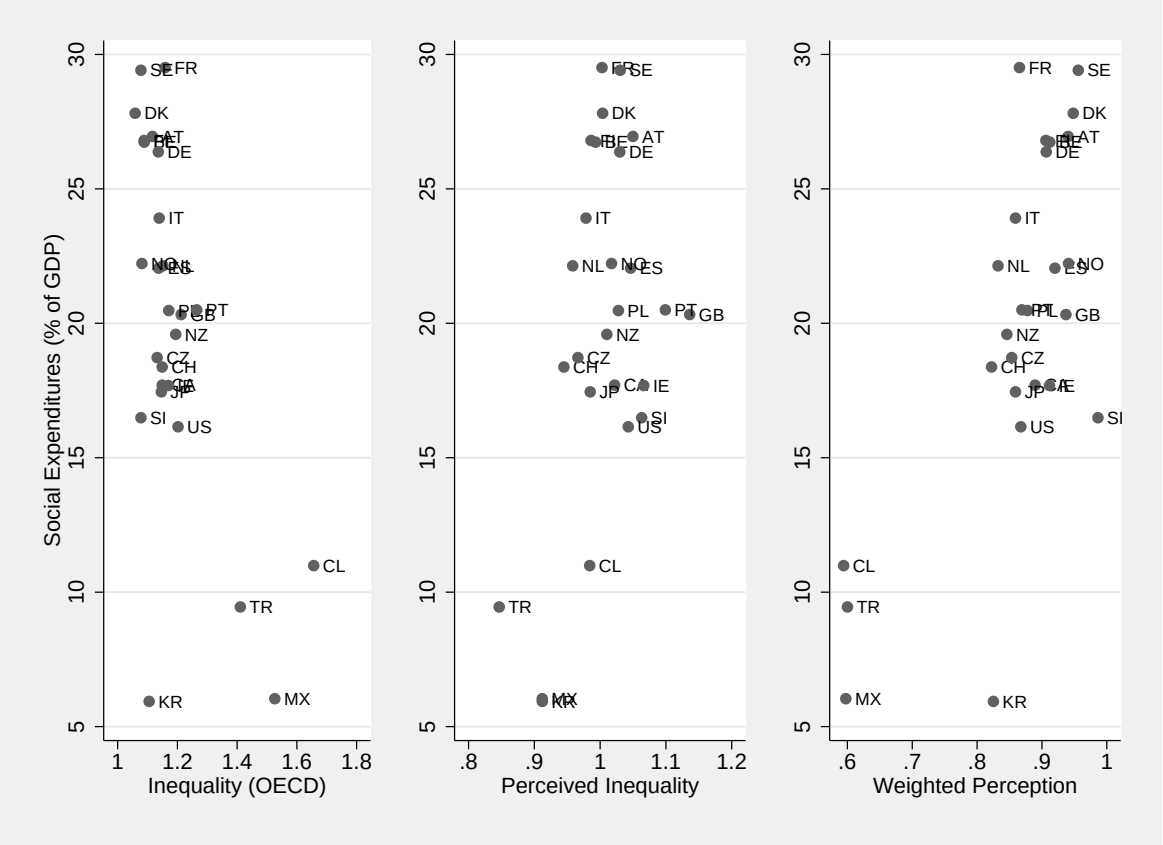



Figure 3.2: Misjudgment and social expenditures.

Table 3.3 provides statistical support for these correlations. Summary statistics including all inequality measures, control variables and the dependent variable are provided in Table 3.A2

Table 3.3: Meltzer-Richard model (dependent variable: social expenditures in percent of GDP) - OLS

| | (1) | | (2) | | (3) | | (4) | | (5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A** | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| inequality (OECD) | -29.95*** | (7.738) | -26.39* | (14.84) | -29.46*** | (7.150) | -11.98** | (5.617) | -22.07** | (8.083) |
| socx80s | | | | | | | 0.650*** | (0.146) | 0.662*** | (0.162) |
| logGDP | | | 5.096 | (4.823) | | | | | -3.745** | (1.364) |
| openness | | | 0.0208 | (0.0280) | | | | | -0.0128 | (0.0176) |
| dependency ratio | | | 1.044 | (0.830) | | | | | 0.429 | (0.422) |
| constant | 54.91*** | (9.344) | -36.72 | (66.64) | 54.90*** | (8.781) | 23.69** | (9.214) | 60.27*** | (18.42) |
| $R^2$ | 0.408 | | 0.535 | | 0.394 | | 0.834 | | 0.859 | |
| $N$ | 26 | | 26 | | 26 | | 26 | | 26 | |

| | (1) | | (2) | | (3) | | (4) | | (5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Panel B** | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| perceived inequality | 54.02** | (20.17) | 27.37 | (17.47) | 49.95** | (19.71) | 21.51* | (12.46) | 20.57 | (13.43) |
| socx80s | | | | | | | 0.703*** | (0.115) | 0.727*** | (0.166) |
| logGDP | | | 9.653*** | (3.460) | | | | | 0.0203 | (1.886) |
| openness | | | 0.0282 | (0.0366) | | | | | -0.00975 | (0.0262) |
| dependency ratio | | | 0.429 | (0.718) | | | | | -0.200 | (0.306) |
| constant | -35.00 | (20.51) | -121.4** | (46.46) | -30.18 | (19.98) | -12.96 | (11.09) | -5.263 | (26.09) |
| $R^2$ | 0.244 | | 0.479 | | 0.212 | | 0.819 | | 0.823 | |
| $N$ | 26 | | 26 | | 26 | | 26 | | 26 | |

| | (1) | | (2) | | (3) | | (4) | | (5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Panel C** | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| weighted perception | 44.77*** | (6.724) | 46.31*** | (14.79) | 43.84*** | (6.746) | 20.43*** | (6.040) | 35.30*** | (9.020) |
| socx80s | | | | | | | 0.611*** | (0.113) | 0.639*** | (0.108) |
| logGDP | | | 2.106 | (3.901) | | | | | -4.732** | (2.111) |
| openness | | | 0.0172 | (0.0313) | | | | | -0.0144 | (0.0164) |
| dependency ratio | | | 1.049 | (0.690) | | | | | 0.408 | (0.341) |
| constant | -19.20*** | (5.714) | -77.82* | (40.13) | -17.65*** | (5.586) | -7.409* | (3.635) | 15.00 | (16.93) |
| $R^2$ | 0.520 | | 0.606 | | 0.491 | | 0.861 | | 0.899 | |
| $N$ | 26 | | 26 | | 26 | | 26 | | 26 | |

Robust standard errors in parentheses: $***p < 0.01$, $**p < 0.05$, $*p < 0.1$

in the Appendix. Table 3.3 Panel A reports, in various specifications, the OLS regressions of social expenditures (in percent of GDP) on actual income inequality, i.e., on the ratio of mean to median income based on official OECD statistics. Specification (1) is the simple regression between actual inequality and social spending, while regressions (2) to (5) add further potential determinants of social spending: current GDP (to capture the positive income elasticity of social spending), the average of total exports and imports as a percentage of GDP (as a standard indicator for international trade openness), the dependency ratio (both to capture the necessity for social spending), and average social expenditure in the 1980s (to capture the path-dependence of social policy). Column (3) is the same as column (1) with data from the 1980s omitted, which are then included in columns (4) and (5) as independent variables.

In conflict with the predictions of the MR hypothesis – but quite in line with what previous empirical studies have found –, the correlation between actual inequality and social spending is always significantly *negative*, suggesting that lower inequality fosters redistribution.

Panel B of Table 3.3 reports the results from regressing, in the same sequence of specifications as before, social expenditures (as a percentage of GDP) on *perceived* income inequality, as measured by the ratio of mean to median income in the distributions imputed from the answers in the ISSP. The correlation between inequality and social expenditure now turns out to be *positive*, in harmony with the MR hypothesis. With the exeption of columns (2) and (5), the coefficient is statistically significant – and even the insignificant coefficients are more in line with the theory than the corresponding negative one in Panel A. In essence, using perceived rather than actual inequality leads to a better performance of the MR hypothesis.

Since there exists both a (negative) correlation between actual and perceived inequality (see Section 3.3.1) and a (negative) correlation between actual inequality and social spending (see Panel A of Table 3.3), we included actual inequality to avoid an omitted variable bias. Panel C in Table 3.3 reports the regressions of social expenditure on the weighted perception of inequality, as defined in Eq. (3.1). The coefficients of the measure of weighted perceptions are highly statistically significant in all specifications and corroborate a positive relationship between inequality and redistribution. We decide to present results from using the ratio of perceived and factual inequality for a more intuitive interpretation. Of course, our results are not driven by using this kind of meausure. Including both - perceived and factual inequality - as separate control variables leads to similar results. The coefficient of perceived inequality remains positive and statistically significant, while the coefficient of factual inequality remains negative.

Across the panels in Table 3.3, the coefficients of all control variables show the expected

signs, when statistically significant. Only does specification (5) lead to an unexpected negative coefficient of per-capita GDP. Excluding lagged social expenditures eliminates this unexpected sign, which might be due to the relatively high correlation between per-capita GDP and lagged social spending. This correlation impedes an efficient estimation of the correlation between both explanatory variables and the dependent variable.

In view of well-known endogeneity issues regressions of social spending on other variables should be interpreted with caution. We cannot fully resolve these issues, but try to capture them by including lagged social spending as an independent variable - as it is standard for assessing the Meltzer-Richard hypothesis (see Tóth et al. (2011) for example). Including lagged social expenditures decreases the absolute magnitude of the coefficients of all inequality measures (see columns (4) and (5) in Table 3.3). It does not affect, however, the striking difference in signs across panels. Out of caution, we refrain from economically interpreting the numerical magnitudes of coefficients. Still our results show that it is important to differentiate between actual and perceived inequality.

### 3.3.3 Robustness checks

We subject our analysis to a variety of robustness checks, none of which qualitatively affects our general conclusion. First, measuring the degree of redistribution by social expenditures per capita (rather than by its percentage in GDP) again produces a positive link between perceived inequality and redistribution (see Table 3.A3 in the Appendix).

We also include variables that previous studies found to be important drivers for (a preference for) more redistribution. These encompass religious attendance, trust, and political ideology (left/right). We constructed quantitative measures for these variables, using data from the World Values Surveys.[8] The results reported in Panels A and B of Table 3.A4 in the Appendix show that, while statistically insignificant jointly, a more leftist attitude, a lower degree of trust and more frequent religious attendance ceteris paribus go along with more redistribution (the latter only insignificantly). The associations between social spending and the inequality measures remain unaffected, though.

Figure 3.2 might suggest that Mexico, Turkey, South Korea and Chile are outliers in our data set. To rule out that they drive statistical significance, we run regressions that exclude them. This does not affect our main results (Panel A and Panel C) qualitatively.[9]

[8] Data can also be obtained from the ISSP. We use the World Values Surveys to keep our sample constant (the ISSP lacks data for Belgium, Mexico, South Korea, Finland, and Turkey).

[9] Results are available on request. Essentially, regressions only using the simple perceived inequality measure (Panel B) lose statistical significance, while maintaining their signs.

Given the limited size of our sample, we also estimate jackknife standard errors to check the robustness of our results. As can be seen in Table 3.A5, the loss of statistical significance is negligible.

To increase the number of observations we run pooled OLS regressions[10], too. Results are shown in Table 3.A6. The first three columns replicate regressions of our main specification in Table 3.3 and in the last two columns wave dummies[11] are included. Results do not change qualitatively.

## 3.4 The POUM hypothesis and perceived social mobility

### 3.4.1 Perceived vs. experienced social mobility

The POUM hypothesis posits that redistribution by the government is lower in democracies the higher is the degree of upward mobility. As with the MR model in the previous section, we again argue that distinguishing between perceived and actual mobility is of crucial importance when empirically testing this hypothesis.

The ISSP provides data that can be used to measure experienced (= actual) as well as perceived social upward mobility. *Experienced* mobility is addressed in this survey question:

> *'Please think about your present job (or your last one if you don't have one now). If you compare this job to the job your father had when you were* $14, 15, 16$*, would you say that the level of status of your job is (or was) . . . 1. Much lower than your father's, 2. Lower, 3. About equal, 4. Higher or 5. Much higher than your father's?'*

The share of respondents who choose answers 4 or 5 (i.e., the fraction of people who think they moved ahead of their fathers in their occupations) serves as our measure of experienced mobility in a society (also see Alesina and La Ferrara, 2005; Corneo and Grüner, 2002; Schokkaert and Truyts, 2014).[12]

[10] We estimate White-Huber standard errors to control for heteroscedastic error terms

[11] In some cases data on social expenditures and inequality measures are not at hand for the same year. Since we posit that inequality impacts on social expenditures, regressions were defined in such a way that inequality measures were merged with social expenditures at least one year later.

[12] When calculating the measure, we exclude all people who have never had a job or who do not know what their father did, never knew their father or whose father never had a job.

Our measure of expected or *perceived* upward mobility is based on the *hard-work question* (also see Alesina et al., 2004; Bjoernskov et al., 2013; Corneo and Grüner, 2002):

> *'Please tick one box to show how important you think hard work is for getting ahead in life (1 – not important at all; 5 – essential).'*

Higher numbers indicate a stronger perception that social structures are permeable, allowing for upward mobility. For comparability, we normalize this measure to the unit interval and then compute, for each country, the average importance of hard work for getting ahead.

Table 3.4: Upward mobility

| | (1) experienced | (2) perceived |
|---|---|---|
| Austria | 0.436 | 0.721 |
| Canada | 0.501 | 0.740 |
| Chile | 0.358 | 0.669 |
| Czech Republic | 0.362 | 0.638 |
| Denmark | 0.468 | 0.681 |
| Finland | 0.482 | 0.744 |
| France | 0.552 | 0.629 |
| Germany | 0.420 | 0.696 |
| Hungary | 0.411 | 0.646 |
| Italy | 0.524 | 0.730 |
| Israel | 0.482 | 0.677 |
| Japan | 0.212 | 0.703 |
| New Zealand | 0.438 | 0.784 |
| Norway | 0.420 | 0.726 |
| Poland | 0.504 | 0.724 |
| Portugal | 0.600 | 0.703 |
| Slovenia | 0.389 | 0.649 |
| South Korea | 0.377 | 0.858 |
| Spain | 0.523 | 0.675 |
| Sweden | 0.391 | 0.718 |
| Switzerland | 0.466 | 0.761 |
| Turkey | 0.353 | 0.798 |
| UK | 0.496 | 0.727 |
| US | 0.500 | 0.816 |

Source: authors' calculations.

Table 3.4 reports the average values of experienced and expected mobility in our sample. The sample covers the years in 1992, 1999 and 2009 for 24 OECD countries in the ISSP.[13] Yearly figures are collected in Table 3.A7 in the Appendix. In 2009, from column (1), the likelihood of being in a higher occupation than one's father ranges from 0.222 in Japan to 0.531 in France. Column (2), where values of perceived mobility range between 0.681 and

[13]These are: Austria, Canada, Chile, Czech Republic, Denmark, Finland, France, Germany, Hungary, Italy, Israel, Japan, New Zealand, Norway, Poland, Portugal, Sweden, Slovenia, South Korea, Spain, Switzerland, Turkey, UK, and the US.

0.878, evidences that people in all sampled countries tend to believe in the importance of hard work for getting ahead and, thus, view their society as allowing for social mobility (albeit to different degrees).

### 3.4.2 Empirical results

Figure 3.3 visualizes a (positive) association between social expenditures (in percent of GDP) and experienced upward mobility as well as a (negative) correlation between social spending and perceived upward mobility. The contrast in directions is similar to what we encountered for the MR hypothesis.[14]

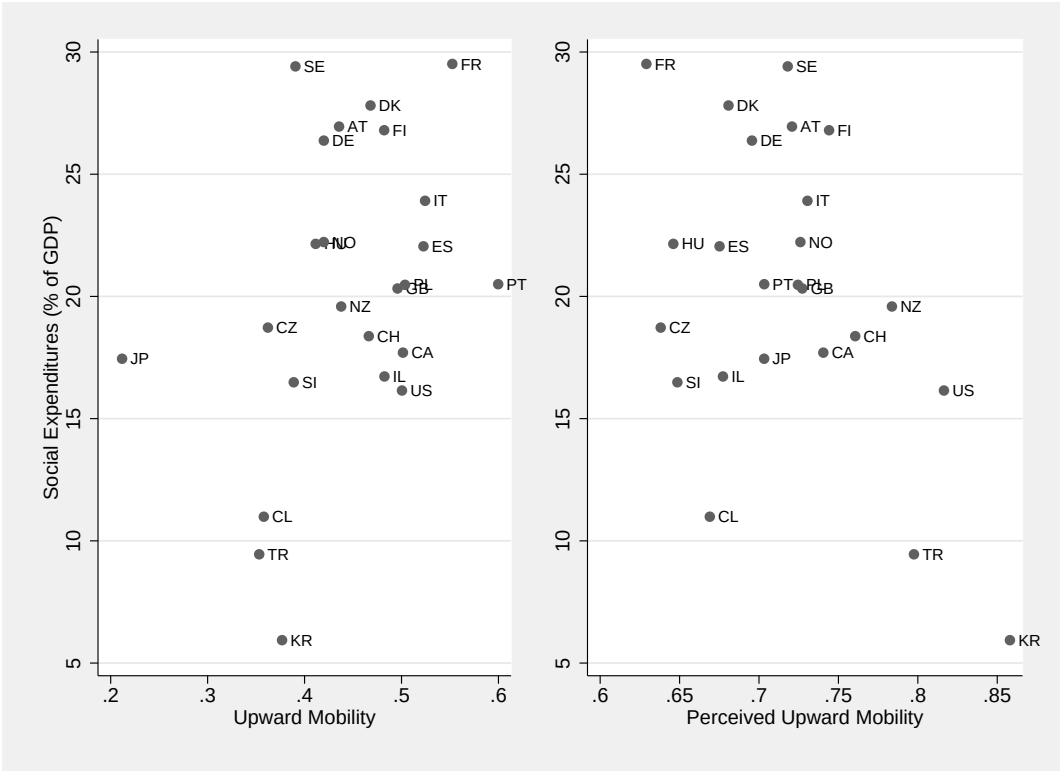



Figure 3.3: Redistribution and upward mobility.

The regressions reported in Table 3.5 confirm the prima facie evidence of Figure 3.3 econometrically. The regressions of redistribution on experienced mobility in Panel A indicate – if anything – a weakly positive correlation, contradicting the POUM hypothesis. Once, we control for path dependence of social spending, the results are statistically insignificant. By contrast, using perceptions as an explanatory variable vindicates the POUM hypothesis (see

[14] While cross-sectional data are used in Figure 3.3, we again checked that these correlations also hold for every single time period.

Panel B): the greater is perceived social mobility, the smaller is the extent of redistribution. All coefficients are statistically significant, at least at the 5%-level. Moreover, these observations are invariant across different specifications, which follow the same pattern as in the previous section (see columns (2) to (4)).

### 3.4.3 Robustness checks

Again, we subjected our analysis to various robustness checks. First, we re-defined the measure of actual (= experienced) mobility by calculating the probability of being in a *much better* occupation than one's father. This more restrictive definition renders all results based on experienced mobility statistically significant (but with coefficients still positive) and, thus, does not alter our general conclusion (results are available on request).

The 'hard-work question', though widely used in the literature, need not perfectly reflect expected upward mobility: even if (one believes that) social mobility is low one could be convinced of the importance of hard work for getting ahead. Therefore, we experimented with a measure of perceived *immobility*: it takes a value of one for a respondent who states that hard work is not important at all to get ahead (and value zero otherwise). For such a respondent we can assume that he does not believe in upward mobility. In line with the POUM hypothesis we would expect that social spending increases with higher perceived social immobility, measured by the population average of the immobility values. As can be seen in Table 3.A8 in the Appendix, this in fact holds empirically.

Table 3.A9 in the Appendix demonstrates that controlling for political and religious attitudes corroborates our findings: Panel A suggests that redistribution is lower the higher is actual social mobility (thus, questioning the factual version of the POUM hypothesis), while Panel B evidences a negative correlation between perceived mobility and social spending.

Table 3.5: POUM hypothesis (dependent variable: social expenditures in percent of GDP) - OLS

| | (1) | | (2) | | (3) | | (4) | |
|---|---|---|---|---|---|---|---|---|
| **Panel A** | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| experienced mobility | 27.82** | (13.34) | 22.02* | (11.96) | 8.568 | (6.928) | 12.35 | (11.07) |
| socex80s | | | | | 0.727*** | (0.142) | 0.590*** | (0.174) |
| logGDP | | | 7.304** | (2.911) | | | 1.387 | (2.396) |
| openness | | | 0.0813** | (0.0386) | | | 0.0569 | (0.0441) |
| dependency ratio | | | 1.058 | (0.830) | | | 0.673 | (0.515) |
| constant | 7.893 | (6.444) | -105.1** | (36.81) | 4.989 | (3.936) | -34.83 | (32.38) |
| $R^2$ | 0.141 | | 0.484 | | 0.800 | | 0.839 | |
| $N$ | 24 | | 24 | | 22 | | 22 | |

| | (1) | | (2) | | (3) | | (4) | |
|---|---|---|---|---|---|---|---|---|
| **Panel B** | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| perceived mobility | -47.93** | (22.09) | -47.94*** | (16.31) | -29.48** | (13.48) | -30.62*** | (9.546) |
| socex80s | | | | | 0.700*** | (0.115) | 0.602*** | (0.136) |
| logGDP | | | 9.242*** | (2.729) | | | 2.632 | (2.395) |
| openness | | | 0.0197 | (0.0432) | | | 0.0130 | (0.0233) |
| dependency ratio | | | 0.558 | (0.687) | | | 0.217 | (0.359) |
| constant | 54.63*** | (15.97) | -59.80 | (45.40) | 30.52** | (11.80) | -2.154 | (30.49) |
| $R^2$ | 0.205 | | 0.540 | | 0.855 | | 0.871 | |
| $N$ | 24 | | 24 | | 22 | | 22 | |

Robust standard errors in parentheses: $***p < 0.01$, $**p < 0.05$, $*p < 0.1$

## 3.5 Conclusions

In democratic political systems the perceptions of the electorate on policy issues matter, potentially even more than objective data. If citizen-voters see an issue, politics has to respond – even if there is no issue; conversely, if a (real) problem is not salient with voters, it is not likely to be addressed forcefully by politicians.

This idea can be applied to 'populist' politics of progressive, redistributive tax-transfer programs. Our study suggests that perceived inequality and expected upwards mobility are reasonably good predictors of social policy, and at least better than measures based on objective, offical or actual data.

Our attempt to trace social expenditures back to perceptions of inequality opens directions for future research. First, to check the stability of our observations it will be interesting to re-run, with measures of perceived inequality or social mobility, some of the elaborate empirical studies in the literature that have tested the MR or the POUM hypothesis with objective measures. Second, changing the dependent variable from actual social spending to preferences for redistribution will show whether perceptions also matter for voters' political demands and wishes, as indicated in Gimpelson and Treisman (2015). Finally, while we took perceptions as exogenous, one could study how these perceptions are shaped. This could then give rise to a more complete understanding of political choices in democracies.

## 3.6 Appendix

Table 3.A1: Weighted perceived inequality by year

| | (1) 1987 | (2) 1992 | (3) 1999 | (4) 2006/07 | (5) 2008/09 |
|---|---|---|---|---|---|
| Austria | | | 0.954 | 0.950 | 0.921 |
| Belgium | | | | 0.912 | |
| Canada | | 0.919 | 0.900 | 0.854 | |
| Chile | | | | 0.537 | 0.633 |
| Czech Republic | | | 0.924 | 0.795 | 0.834 |
| Denmark | | | | | 0.940 |
| Finland | | | | 0.887 | 0.920 |
| France | | | 0.965 | 0.819 | 0.797 |
| Germany | 0.969 | 0.991 | 1.000 | 0.803 | 0.835 |
| Ireland | | | | 0.899 | 0.902 |
| Italy | | 0.912 | | | 0.835 |
| Japan | | | 0.932 | 0.828 | 0.816 |
| Mexico | | | | 0.616 | |
| Netherlands | 0.831 | | | | 0.838 |
| New Zealand | | 0.837 | 0.889 | 0.820 | 0.837 |
| Norway | | 0.966 | 0.894 | 0.987 | 0.918 |
| Poland | | | 0.909 | 0.864 | 0.923 |
| Portugal | | | 0.843 | | 0.898 |
| Slovenia | | | 1.094 | 0.972 | 0.916 |
| South Korea | | | | 0.833 | 0.817 |
| Spain | | | 1.013 | 0.872 | 0.873 |
| Sweden | | 0.996 | 0.964 | 0.938 | 0.927 |
| Switzerland | | | | | 0.828 |
| Turkey | | | | | 0.630 |
| UK | 0.967 | 0.934 | 0.944 | | |
| US | 0.905 | 0.919 | 0.877 | 0.888 | 0.788 |

*Notes:* Weighted perceived inequality is the ratio of perceived mean-to-median ratio (ISSP) and official mean-to-median ratio (OECD).
This Table shows the available data for our sample. As can be seen, there is only one observation for Belgium, Denmark, Mexico, Switzerland, and Turkey. Data limitations result from missing ISSP data in the remaining years. These countries get lost in the pooled OLS specification (Table 3.A6).

Table 3.A2: Summary statistics

| Variable | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|
| inequality (OECD) | 1.185 | 0.14 | 1.059 | 1.656 |
| perceived inequality | 1.021 | 0.068 | 0.917 | 1.146 |
| weighted perception | 0.869 | 0.076 | 0.656 | 0.995 |
| socx | 19.992 | 6.586 | 5.936 | 29.513 |
| socx80s | 16.143 | 7.703 | 0 | 28.933 |
| gdp (per capita) | 24195 | 7223 | 9789 | 37290 |
| trade openness | 75.23 | 33.245 | 24.042 | 148.304 |
| dependency ratio | 33.230 | 1.921 | 29.194 | 38.778 |
| ideology | 5.422 | 0.345 | 4.727 | 6.063 |
| attendance | 3.956 | 1.062 | 2.387 | 6.068 |
| trust | 0.359 | 0.166 | 0.115 | 0.695 |

*Notes:* Summary statistics are based on cross-sectional data from 1987 to 2009. *Perceived inequality* is based on ISSP data, *ideology*, *attendance*, and *trust* are based on the World Values Survey (WVS), the remaining variables are based on the OECD iLibrary.

Table 3.A3: Social expenditures per capita and inequality

| **Panel A** | (1) Coeff. | (1) Std. Err. | (2) Coeff. | (2) Std. Err. | (3) Coeff. | (3) Std. Err. | (4) Coeff. | (4) Std. Err. | (5) Coeff. | (5) Std. Err. |
|---|---|---|---|---|---|---|---|---|---|---|
| inequality (OECD) | -9,010*** | (1,817) | -5,653** | (2,679) | -10,413*** | (2,059) | -5,060*** | (1,364) | -4,179** | (1,920) |
| socx80s | | | | | | | 199.1*** | (32.68) | 123.7*** | (34.97) |
| logGDP | | | 2,337*** | (680.3) | | | | | 2,113*** | (415.1) |
| openness | | | 7.560 | (5.989) | | | | | 0.209 | (5.585) |
| dependency ratio | | | 398.0*** | (106.3) | | | | | 269.1*** | (74.66) |
| constant | 14,568*** | (2,227) | -27,075*** | (8,871) | 16,806*** | (2,564) | 7,250*** | (2,201) | -23,147*** | (5,927) |
| $R^2$ | 0.475 | | 0.827 | | 0.452 | | 0.830 | | 0.931 | |
| $N$ | 26 | | 26 | | 26 | | 26 | | 26 | |

| **Panel B** | (1) Coeff. | (1) Std. Err. | (2) Coeff. | (2) Std. Err. | (3) Coeff. | (3) Std. Err. | (4) Coeff. | (4) Std. Err. | (5) Coeff. | (5) Std. Err. |
|---|---|---|---|---|---|---|---|---|---|---|
| perceived inequality | 13,050** | (5,673) | 2,433 | (3,203) | 14,013** | (6,582) | 4,599 | (3,559) | 708.8 | (2,980 |
| socx80s | | | | | | | 232.6*** | (35.12) | 140.7*** | (42.75) |
| logGDP | | | 3,759*** | (529.9) | | | | | 3,035*** | (337.8) |
| openness | | | 8.707 | (7.630) | | | | | 0.450 | (7.483) |
| dependency ratio | | | 272.4** | (105.9) | | | | | 150.1** | (64.38) |
| constant | -9,252 | (5,727) | -46,746*** | (6,293) | -9,606 | (6,635) | -3,905 | (3,072) | -34,636*** | (6,636) |
| $R^2$ | 0.183 | | 0.765 | | 0.153 | | 0.764 | | 0.908 | |
| $N$ | 26 | | 26 | | 26 | | 26 | | 26 | |

| **Panel C** | (1) Coeff. | (1) Std. Err. | (2) Coeff. | (2) Std. Err. | (3) Coeff. | (3) Std. Err. | (4) Coeff. | (4) Std. Err. | (5) Coeff. | (5) Std. Err. |
|---|---|---|---|---|---|---|---|---|---|---|
| weighted perception | 12,755*** | (1,578) | 8,010*** | (2,281) | 14,626*** | (2,033) | 7,257*** | (1,540) | 5,438** | (2,101) |
| socx80s | | | | | | | 192.3*** | (22.27) | 123.6*** | (30.34) |
| logGDP | | | 2,165*** | (558.3) | | | | | 2,124*** | (457.5) |
| openness | | | 7.149 | (6.555) | | | | | 0.127 | (5.895) |
| dependency ratio | | | 377.8*** | (71.57) | | | | | 245.8*** | (67.04) |
| constant | -7,109*** | (1,268) | -38,221*** | (4,728) | -8,088*** | (1,603) | -4,865*** | (1,059) | -32,101*** | (5,103) |
| $R^2$ | 0.544 | | 0.834 | | 0.502 | | 0.839 | | 0.931 | |
| $N$ | 26 | | 26 | | 26 | | 26 | | 26 | |

Robust standard errors in parentheses: $***p < 0.01$, $**p < 0.05$, $*p < 0.1$
*Dependent variable: Social expenditures as percentage of GDP*

Table 3.A4: Robustness check: social expenditures (in % of GDP) and perceived inequality

| | (1) | | (2) | | (3) | | (4) | |
|---|---|---|---|---|---|---|---|---|
| **Panel A** | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| weighted perception | 35.05*** | (7.148) | 36.30*** | (8.216) | 35.11*** | (8.503) | 33.94*** | (7.495) |
| socx80s | 0.586*** | (0.0895) | 0.601*** | (0.0979) | 0.649*** | (0.0991) | 0.603*** | (0.0978) |
| logGDP | -5.114** | (1.796) | -5.312** | (2.044) | -3.625 | (2.533) | -3.881* | (2.076) |
| dependency ratio | 0.622* | (0.325) | 0.516 | (0.320) | 0.570* | (0.303) | 0.600* | (0.320) |
| openness | -0.00820 | (0.0131) | -0.0102 | (0.0131) | -0.0104 | (0.0169) | -0.00906 | (0.0129) |
| ideology | -2.298 | (1.487) | | | | | -1.337 | (1.204) |
| rel. attendance | | | -0.380 | (0.503) | | | -0.418 | (0.491) |
| trust | | | | | -5.396 | (3.796) | -4.463 | (3.727) |
| constant | 25.52* | (14.68) | 18.91 | (15.92) | 0.512 | (23.39) | 12.36 | (19.85) |
| $R^2$ | 0.920 | | 0.911 | | 0.916 | | 0.925 | |
| N | 26 | | 26 | | 26 | | 26 | |
| | (1) | | (2) | | (3) | | (4) | |
| **Panel B** | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| inequality (OECD) | -24.07*** | (6.401) | -22.01** | (7.876) | -23.67** | (9.017) | -24.14*** | (7.679) |
| socx80s | 0.569*** | (0.130) | 0.639*** | (0.166) | 0.684*** | (0.143) | 0.613*** | (0.147) |
| logGDP | -4.631*** | (1.256) | -3.952** | (1.408) | -1.769 | (1.889) | -2.940* | (1.675) |
| dependency ratio | 0.777* | (0.419) | 0.504 | (0.459) | 0.684 | (0.436) | 0.799* | (0.444) |
| openness | -0.00610 | (0.0143) | -0.00945 | (0.0177) | -0.00994 | (0.0188) | -0.00738 | (0.0161) |
| ideology | -3.982** | (1.483) | | | | | -2.784 | (1.626) |
| rel. attendance | | | -0.160 | (0.463) | | | -0.111 | (0.349) |
| trust | | | | | -10.04** | (3.933) | -6.664 | (4.562) |
| constant | 83.28*** | (19.19) | 61.07*** | (19.24) | 36.98 | (24.33) | 61.02** | (26.81) |
| $R^2$ | 0.899 | | 0.865 | | 0.894 | | 0.909 | |
| N | 26 | | 26 | | 26 | | 26 | |

Robust standard errors in parentheses: $***p<0.01, **p<0.05, *p<0.1$
*Dependent variable: Social expenditures in percent of GDP*

Table 3.A5: Meltzer-Richard model (dependent variable: social expenditures in percent of GDP) - Jackknife

| | (1) | | (2) | | (3) | | (4) | | (5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Panel A** | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| inequality (OECD) | -29.95** | (11.99) | -26.39 | (36.08) | -29.46** | (10.70) | -11.98 | (7.833) | -22.07 | (17.32) |
| socx80s | | | | | | | 0.650*** | (0.198) | 0.662** | (0.264) |
| logGDP | | | 5.096 | (7.492) | | | | | -3.745* | (2.006) |
| openness | | | 0.0208 | (0.0360) | | | | | -0.0128 | (0.0262) |
| dependency ratio | | | 1.044 | (1.316) | | | | | 0.429 | (0.704) |
| constant | 54.91*** | (14.02) | -36.72 | (99.36) | 54.90*** | (12.64) | 23.69* | (12.79) | 60.27** | (28.13) |
| $R^2$ | 0.408 | | 0.535 | | 0.394 | | 0.834 | | 0.859 | |
| $N$ | 26 | | 26 | | 26 | | 26 | | 26 | |
| replications | 26 | | 26 | | 26 | | 26 | | 26 | |

| | (1) | | (2) | | (3) | | (4) | | (5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Panel B** | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| perceived inequality | 54.02** | (22.95) | 27.37 | (22.31) | 49.95** | (22.08) | 21.51 | (15.69) | 20.57 | (19.00) |
| socx80s | | | | | | | 0.703*** | (0.150) | 0.727*** | (0.257) |
| logGDP | | | 9.653** | (4.083) | | | | | 0.0203 | (2.337) |
| openness | | | 0.0282 | (0.0445) | | | | | -0.00975 | (0.0373) |
| dependency ratio | | | 0.429 | (0.995) | | | | | -0.200 | (0.437) |
| constant | -35.00 | (23.32) | -121.4** | (58.34) | -30.18 | (22.35) | -12.96 | (13.74) | -5.263 | (36.17) |
| $R^2$ | 0.244 | | 0.479 | | 0.212 | | 0.819 | | 0.823 | |
| $N$ | 26 | | 26 | | 26 | | 26 | | 26 | |
| replications | 26 | | 26 | | 26 | | 26 | | 26 | |

| | (1) | | (2) | | (3) | | (4) | | (5) | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Panel C** | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| weighted perception | 44.77*** | (7.775) | 46.31** | (18.21) | 43.84*** | (7.558) | 20.43** | (9.905) | 35.30** | (15.74) |
| socx80s | | | | | | | 0.611*** | (0.170) | 0.639*** | (0.210) |
| logGDP | | | 2.106 | (4.813) | | | | | -4.732* | (2.720) |
| openness | | | 0.0172 | (0.0378) | | | | | -0.0144 | (0.0242) |
| dependency ratio | | | 1.049 | (0.913) | | | | | 0.408 | (0.493) |
| constant | -19.20*** | (6.695) | -77.82 | (48.83) | -17.65** | (6.338) | -7.409 | (5.852) | 15.00 | (22.54) |
| $R^2$ | 0.520 | | 0.606 | | 0.491 | | 0.861 | | 0.899 | |
| $N$ | 26 | | 26 | | 26 | | 26 | | 26 | |
| replications | 26 | | 26 | | 26 | | 26 | | 26 | |

Robust standard errors in parentheses: $***p < 0.01$, $**p < 0.05$, $*p < 0.1$

Table 3.A6: Meltzer-Richard model (dependent variable: social expenditures in percent of GDP) - pooled OLS

| **Panel A** | (1) Coeff. | (1) Std. Err. | (2) Coeff. | (2) Std. Err. | (3) Coeff. | (3) Std. Err. | (4) Coeff. | (4) Std. Err. | (5) Coeff. | (5) Std. Err. |
|---|---|---|---|---|---|---|---|---|---|---|
| inequality (OECD) | -29.02*** | (4.452) | -18.05** | (6.965) | -20.82*** | (6.575) | -18.48** | (7.127) | -29.04*** | (7.112) |
| socx80s | | | 0.501*** | (0.179) | 0.407** | (0.171) | 0.516** | (0.185) | 0.457** | (0.179) |
| logGDP | | | | | -1.161 | (1.257) | | | -5.563*** | (1.500) |
| openness | | | | | 0.0257 | (0.0201) | | | 0.0125 | (0.0195) |
| dependency ratio | | | | | 0.661 | (0.391) | | | 0.849** | (0.377) |
| time dummies | no | | no | | no | | yes | | yes | |
| constant | 55.29*** | (5.368) | 34.12*** | (11.32) | 27.18 | (17.20) | 32.15** | (11.56) | 71.38*** | (16.07) |
| $R^2$ | 0.302 | | 0.625 | | 0.657 | | 0.690 | | 0.758 | |
| $N$ | 64 | | 64 | | 64 | | 64 | | 64 | |

| **Panel B** | (1) Coeff. | (1) Std. Err. | (2) Coeff. | (2) Std. Err. | (3) Coeff. | (3) Std. Err. | (4) Coeff. | (4) Std. Err. | (5) Coeff. | (5) Std. Err. |
|---|---|---|---|---|---|---|---|---|---|---|
| perceived inequality | 13.72 | (11.15) | 5.965 | (9.796) | 8.669 | (10.37) | 19.12 | (12.75) | 19.02 | (11.27) |
| socx80s | | | 0.590*** | (0.187) | 0.493** | (0.206) | 0.598*** | (0.179) | 0.537** | (0.216) |
| logGDP | | | | | 2.063 | (1.951) | | | 0.537** | (0.216) |
| openness | | | | | 0.0284 | (0.0305) | | | 0.0207 | (0.0317) |
| dependency ratio | | | | | 0.343 | (0.397) | | | 0.388 | (0.349) |
| time dummies | no | | no | | no | | yes | | yes | |
| constant | 7.511 | (11.65) | 5.514 | (8.106) | -30.16 | (29.70) | -10.71 | (10.93) | -22.91 | (29.92) |
| $R^2$ | 0.028 | | 0.527 | | 0.565 | | 0.614 | | 0.628 | |
| $N$ | 64 | | 64 | | 64 | | 64 | | 64 | |

| **Panel C** | (1) Coeff. | (1) Std. Err. | (2) Coeff. | (2) Std. Err. | (3) Coeff. | (3) Std. Err. | (4) Coeff. | (4) Std. Err. | (5) Coeff. | (5) Std. Err. |
|---|---|---|---|---|---|---|---|---|---|---|
| weighted perception | 30.92*** | (5.990) | 18.31** | (8.890) | 18.82** | (7.973) | 27.58*** | (8.786) | 41.45*** | (7.786) |
| socx80s | | | 0.520*** | (0.166) | 0.421** | (0.171) | 0.510*** | (0.151) | 0.463*** | (0.136) |
| logGDP | | | | | 0.813 | (1.357) | | | -5.569*** | (1.464) |
| openness | | | | | 0.0271 | (0.0232) | | | 0.00372 | (0.0170) |
| dependency ratio | | | | | 0.527 | (0.372) | | | 0.823*** | (0.288) |
| time dummies | no | | no | | no | | yes | | yes | |
| constant | -5.731 | (5.381) | -3.350 | (5.450) | -29.81 | (19.25) | -14.51** | (5.830) | 0.950 | (13.12) |
| $R^2$ | 0.245 | | 0.599 | | 0.629 | | 0.720 | | 0.791 | |
| $N$ | 64 | | 64 | | 64 | | 64 | | 64 | |

Robust standard errors in parentheses: $***p < 0.01$, $**p < 0.05$, $*p < 0.1$
*Wave 1 (1980s) is skipped in all regressions.*

Table 3.A7: Measures for upward mobility by year

| | 1992 | | 1999 | | 2009 | |
|---|---|---|---|---|---|---|
| | experienced | perceived | experienced | perceived | experienced | perceived |
| Austria | 0.434 | 0.773 | 0.4293 | 0.631 | 0.444 | 0.759 |
| Canada | 0.537 | 0.823 | 0.466 | 0.658 | | |
| Chile | | | 0.344 | 0.575 | 0.372 | 0.764 |
| Czech Republic | | | 0.382 | 0.460 | 0.343 | 0.816 |
| Denmark | | | | | 0.468 | 0.681 |
| Finland | | | | | 0.482 | 0.744 |
| France | | | 0.574 | 0.533 | 0.531 | 0.725 |
| Germany | 0.457 | 0.725 | 0.383 | 0.666 | | |
| Hungary | 0.448 | 0.719 | 0.445 | 0.422 | 0.341 | 0.798 |
| Italy | 0.578 | 0.706 | | | 0.471 | 0.755 |
| Israel | | | 0.532 | 0.578 | 0.432 | 0.776 |
| Japan | | | 0.202 | 0.638 | 0.222 | 0.768 |
| New Zealand | 0.442 | 0.848 | 0.440 | 0.624 | 0.432 | 0.878 |
| Norway | 0.384 | 0.779 | 0.427 | 0.581 | 0.448 | 0.819 |
| Poland | 0.516 | 0.805 | 0.494 | 0.553 | 0.500 | 0.816 |
| Portugal | | | 0.630 | 0.529 | 0.569 | 0.878 |
| Slovenia | 0.392 | 0.689 | 0.3819 | 0.472 | 0.392 | 0.784 |
| South Korea | | | | | 0.377 | 0.858 |
| Spain | | | 0.574 | 0.579 | 0.472 | 0.772 |
| Sweden | 0.354 | 0.755 | 0.374 | 0.615 | 0.443 | 0.784 |
| Switzerland | | | | | 0.466 | 0.761 |
| Turkey | | | | | 0.353 | 0.798 |
| UK | 0.517 | 0.831 | 0.474 | 0.623 | | |
| US | 0.565 | 0.849 | 0.478 | 0.724 | 0.458 | 0.876 |

Table 3.A8: Social expenditures (in % of GDP) and perceived immobility

| | (1) | | (2) | | (3) | |
|---|---|---|---|---|---|---|
| | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| perceived immobility | 34.61 | (21.27) | 34.23* | (19.27) | 34.84** | (13.67) |
| socex80s | 0.795*** | (0.118) | 0.681*** | (0.170) | 0.665*** | (0.152) |
| logGDP | | | 2.316 | (2.529) | 3.074 | (3.585) |
| openness | | | 0.0302 | (0.0363) | 0.852* | (0.424) |
| dependency ratio | | | 0.418 | (0.475) | 0.0575 | (0.0341) |
| ideology | | | | | -2.921 | (2.151) |
| rel. attendance | | | | | 1.222* | (0.675) |
| trust | | | | | -0.750 | (6.666) |
| constant | 54.63*** | (15.97) | -31.34 | (34.95) | -43.70 | (39.30) |
| $R^2$ | 0.825 | | 0.847 | | 0.888 | |
| $N$ | 22 | | 22 | | 22 | |

Robust standard errors in parentheses: $***p<0.01, **p<0.05, *p<0.1$
*Dependent variable: Social expenditures in percent of GDP*

Table 3.A9: Social expenditures (in % of GDP) and perceived mobility - robustness check

| | (1) | | (2) | | (3) | | (4) | |
|---|---|---|---|---|---|---|---|---|
| **Panel A** | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| perceived mobility | -26.27** | (9.812) | -33.10*** | (9.898) | -24.86** | (10.37) | -26.86** | (11.14) |
| socex80s | 0.596*** | (0.138) | 0.607*** | (0.114) | 0.637*** | (0.136) | 0.620*** | (0.134) |
| logGDP | 2.373 | (2.488) | 3.418 | (2.287) | 4.047 | (3.057) | 3.922 | (3.516) |
| dependency ratio | 0.298 | (0.428) | 0.516 | (0.346) | 0.383 | (0.391) | 0.642 | (0.363) |
| openness | 0.0188 | (0.0234) | 0.0339 | (0.0226) | 0.0260 | (0.0261) | 0.0436 | (0.0252) |
| ideology | -1.425 | (1.611) | | | | | -1.014 | (1.889) |
| rel. attendance | | | 1.176** | (0.519) | | | 1.105* | (0.619) |
| trust | | | | | -5.906 | (4.358) | -3.069 | (6.340) |
| constant | 2.108 | (31.70) | -24.30 | (27.39) | -25.65 | (41.41) | -32.14 | (42.75) |
| $R^2$ | 0.875 | | 0.889 | | 0.880 | | 0.895 | |
| N | 22 | | 22 | | 22 | | 22 | |

| | (1) | | (2) | | (3) | | (4) | |
|---|---|---|---|---|---|---|---|---|
| **Panel B** | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| experienced mobility | 7.966 | (12.04) | 10.92 | (11.76) | 6.417 | (11.50) | 2.360 | (13.11) |
| socex80s | 0.592*** | (0.159) | 0.602*** | (0.170) | 0.659*** | (0.159) | 0.659*** | (0.156) |
| logGDP | 1.255 | (2.538) | 1.702 | (2.512) | 3.761 | (3.206) | 3.451 | (3.452) |
| dependency ratio | 0.677 | (0.525) | 0.795 | (0.541) | 0.748 | (0.511) | 0.906 | (0.512) |
| openness | 0.0550 | (0.0406) | 0.0663 | (0.0486) | 0.0615 | (0.0430) | 0.0723 | (0.0438) |
| ideology | -2.375 | (1.794) | | | | | -1.965 | (2.152) |
| rel. attendance | | | 0.529 | (0.756) | | | 0.766 | (0.760) |
| trust | | | | | -8.467 | (5.065) | -6.122 | (5.599) |
| constant | -18.70 | (33.70) | -44.33 | (35.23) | -57.39 | (40.34) | -51.54 | (41.50) |
| $R^2$ | 0.851 | | 0.842 | | 0.855 | | 0.865 | |
| N | 22 | | 22 | | 22 | | 22 | |

Robust standard errors in parentheses: $***p<0.01, **p<0.05, *p<0.1$
*Dependent variable: Social expenditure in percent of GDP*

# 4 What do Germans think and know about income inequality? A survey experiment[1]

## 4.1 Introduction

What do Germans know and think about income inequality in their country? In a nutshell: they do not know much. In particular, they do not know their own position in the income distribution. They know that they do not know much – but across all income groups they think that inequality should be reduced. They do not change their minds when they learn more about inequality – only those who learn that they are net contributors to the tax transfer system become less supportive of more redistribution.

These are the main observations from a survey experiment on the perceptions and preferences of Germans with respect to income inequality and redistribution that we conducted in early 2015 and that we report in this paper. While there is some international evidence (surveyed in Section 4.2) that perceived inequality does not coincide with measured, 'objective' inequality, a detailed analysis for Germany has, to our knowledge, not been available so far.

We conducted a survey in a representative sample of 1,100 German households that included two randomized information treatments (see Section 4.3). Participants were asked for the income of their household, for their perceived own rank in the German income distribution, for their opinions on the current level of inequality and about their perceptions and preferences of social stratification.

Our first observation is that survey respondents systematically fail to locate their own position in the income scale even roughly. Relatively poor respondents tend to overestimate their

[1]This chapter is co-authored with Andreas Wagener, Institute of Economic Policy, University of Hannover. It is forthcoming in the Socio-Economic Review and is available via https://doi.org/10.1093/ser/mwx036. Publication within this thesis with kind permission of Oxford University Press. An earlier version of this chapter is available as ECINEQ Working Paper 2016 - 389.

own rank while relatively rich respondents tend to underestimate their relative income. *Cum grano salis,* this suggests that the income distribution is perceived to be more equalized than it actually is. When respondents were asked which of several stylized shapes best describes the German society today, they were right only slightly more often than by chance.

An unexpected second observation is that respondents across all income groups asked for more redistribution. Not only was this preference omnipresent – its strength is fairly constant across income deciles. Moreover, asked for their most-preferred pattern of stratification, respondents selected the most egalitarian ones out of the choices we gave them.

In two information treatments we checked how far redistributive preference is driven by biased perceptions. The treatment group was informed about their true position in the income distribution. This information did not alter preferences for redistribution, though. One potential interpretation is that, given that already the pretreatment preferences for more redistribution were strong, a treatment that, if anything, taught respondents that income inequality was higher than they had previously thought, cannot have much effect. In a second step, members of the (first) treatment group were informed whether they were net contributors to, or net beneficiaries from, the tax-transfer system in Germany. Respondents who learned that they were losing from redistribution asked for less redistribution afterwards.

We would like to emphasize the agnostic nature of our survey. In particular, we did not conduct it with a view that respondents hold – or should hold – a stable, consistent or well-argued view on redistribution. We just wanted to find out what respondents really know and think. Still, it is tempting to distill some coherence out of the responses we obtained. As far as possible, we tried; more far-reaching interpretations would be speculative and not backed by the survey data themselves.

The rest of this paper is organized as follows: Section 4.2 embeds our survey experiment and its findings into the extant literature. Section 4.3 describes the survey and our sample. Section 4.4 documents the biases in the self-assessment of income positions. Section 4.5 turns to the strong preferences for redistribution, both before and after informational treatment. Perceptions of and preferences for social stratification are discussed in Section 4.6. Section 4.7 shows that pocketbook attenuate preferences for redistribution. Some conclusions are offered in Section 4.8. Additional material is collected in an Appendix.

## 4.2 Related literature

Our survey experiment on the correlations between (mis-)perceptions of inequality and views on redistribution is related to a number of contributions in the literature.

**Similar surveys:** To the best of our knowledge, studies of similar type so far only exist for Argentina, Sweden and Norway. Cruces et al. (2013) collected data on household incomes and on the self-assessments of income ranks in the Argentine income distribution. Their study finds that the relatively poor tend to overestimate their relative positions while the relatively rich tend to underestimate theirs. When biased subjects were confronted with accurate information, (only) the preferences of the relatively poor changed in the direction of calling for more redistribution. Karadja et al. (2017) ran a similar survey experiment for Sweden. Roughly three-quarters of their respondents missed their relative position by more than 10 percentage points, and 92 % of this group underestimated their position. An information treatment was largely ineffective; only conservative respondents who learned that they were richer than they thought demanded less redistribution. In a study on the effects of income transparency on well-being in Norway, Perez-Truglia (2016) finds biases in respondents' perceptions of their own relative income ranks. An information treatment moderated these biases and made respondents change their preferences for redistribution (the gradient between redistribution preferences and actual income rank should increased).

We transfer the setting of Cruces et al. (2013) and Karadja et al. (2017) to the German case. Our study differs, however, by including assessments of social stratification (for a motivation, see below) and pocketbook concerns. Our first finding – that the poor think they are richer and vice versa – is in line with previous observations. Our second observation – that better knowledge does not change minds – adds a piece of negative evidence to the mixed collection of results on information treatments.

**Misperceptions of inequality:** Our survey respondents substantially misperceive the income distribution in Germany: they systematically fail to locate their own position on the income scale and they get the assessment of the (stylized) social stratification in Germany right only slightly more often than by mere chance. Such misperceptions on income inequality are not uncommon, irrespective of how (perceived) inequality is measured.[2] Using perceived

[2]Popular misperceptions also prevail with other issues (inflation, corruption, risks etc.). See Stevenson and Duch (2013) for a discussion. A potential common root is that individuals make inferences about objective reality from the limited sample of their own experiences and observations. For example, their reference group – relatives, friends, neighbors and colleagues – is typically not a cross-section of society but less heterogeneous. This biased and limited availability of social comparison leads to biased inferences (e.g.

wage differences between various occupations, Osberg and Smeeding (2006) find a massive underestimation of wage inequality in the US. Kenworthy and McCall (2008) calculate perceived relative wage levels for different countries and show that perceived and actual time trends of inequality are inconsistent. Norton and Ariely (2011) exhibit a dramatic underestimation of wealth inequality in the US population. Engelhardt and Wagener (2014) construct hypothetical perceived income distributions for 26 OECD countries by aggregating the self-positioning among International Social Survey Program (ISSP) respondents; they find that the inequality in these perceived distributions is considerably below actual inequality.

Not all studies find that populations underestimate inequality in their societies. Using the ISSP question which type of society, visualized by rhomb- or pyramid-shaped graphs, best describes the society respondents were living in, Niehues (2014) and Gimpelson and Treisman (2015) show that knowledge of social stratification is low, but involves an overestimation of inequality. This suggests that studies based on individual incomes, wages or wealth and the attending self-positioning biases observe an underestimation of inequality while studies using perceived social stratification detect an overestimation of inequality. Both approaches, called the 'comparative' and the 'normative' view in D'Ambrosio and Clark (2015), differ conceptually: the first presupposes that the perceived structure of the society (or at least of its income distribution) is derived from one's own position, relative to some reference group. By contrast, the second approach operates with the structure of society as a whole and does not require that individuals position themselves in the perceived or desired society. We combine both approaches in our survey – and indeed confirm for Germany that biases go into different directions.

**Information treatments:** Methodologically, our survey design follows a strand of literature that uses information as an experimental treatment in a field setting. Some studies support the knowledge gap theory proposed by Tichenor et al. (1970), arguing that differences in decision quality are, to some degree, based on different levels of knowledge. In a rational choice approach this would imply that, when new information arrives, people update their beliefs (e.g. in a Bayesian fashion), which might affect their revealed preferences. For example, Duflo and Saez (2003) show this with regard to retirement plans and Jensen (2010) with regard to educational decisions. Other studies provide evidence for the knowledge-behavior gap theory, due to Hornik (1989), positing that additional information will only affect decisions and actions if it successfully changes the underlying beliefs, habits, emotions etc. on which decisions are based.

The results of our rather ineffective first information treatment indicate – in line with

Evans and Kelley, 2004; Runciman, 1966).

knowledge-behavior gap theory – that information does not suffice to change minds; what matters is whether beliefs or constraints are addressed by the information treatment. Interestingly, however, the more effective second information treatment with its direct appeal to individual monetary (dis-)advantages shows a potentially promising way to make knowledge updates change behavior.

## 4.3 Survey and sample

### 4.3.1 The survey

The online survey was conducted in February 2015 and interviewed a random sample of 1,100 households in Germany. Data collection was performed by Norstat company.[3] All participants were asked for their incomes, for a set of individual and household characteristics and general political attitudes as well as for their views and knowledge on income inequality in Germany. Two informational treatments (detailed below) followed.

In terms of income, we asked respondents for the average monthly income of their household in 2014.[4] To enable respondents to make meaningful comparisons of households of different size, we broadly explained to them the concept of equivalent incomes, and then informed them about their monthly net household income corrected by the modified OECD equivalence weight. We then asked them:

> 'What do you think, how many households in Germany have an equal or lower standard of living than yours?'

Response categories were given in deciles. We then compared respondents' perceived decile to their actual income decile. These objective deciles were calculated from the boundaries of deciles of the German monthly net household income distribution, corrected by the modified OECD equivalence weights, based on the then most recent German Socio-Economic Panel (GSOEP 2012, v29).

Social stratification was expressed by five different stylized types of society (for details see Section 4.6). We introduced them to our respondents and asked them to state which type best describes German society today and of which type Germany ought to be.

[3] Norstat is a market research company (http://opinion-people.com/de). Participants in Norstat panels can collect points that can be exchanged for money.

[4] In 2015 – the survey year – a minimum wage was implemented in Germany. Therefore, we restrict our analysis to the previous period to avoid (unknown) biases resulting from this reform.

The experiment proceeded as follows: after a first set of questions on attitudes toward income inequality and social stratification, income, and self-assessment in the income distribution for everybody, we randomly split the group of participants into two halves who would continue with different questionnaires. Each questionnaire again posed questions on respondents' preferences for redistribution and social stratification, but they differed in the amount of information we provided to participants: before we asked them to (re-)state their preferences, individuals in the treatment group were informed about the income distribution, their actual relative position and their self-positioning bias; the control group did not get any such information.

Our design is inspired by the information treatment in Cruces et al. (2013), but we provided the treatment group with detailed information about the actual income distribution, their relative position in it and which income belongs to the relative position they estimated to be associated with. All information was given graphically and in written.

To test the role of self-interest and pocketbook concerns we implemented, within the first treatment group, a second information treatment.[5] Here, we informed respondents whether they are (likely to be) a net payer or net beneficiary from the German tax-transfer system. This information does not target at respondents' beliefs but at their budget constraints.

Our design allows us to use difference-in-differences approaches when assessing outcomes. We included two information treatments to check the robustness of the stated preferences for (more) redistribution. In Sections 4.5 and 4.6 we will report on the first information treatment. The second treatment will be dealt with in Section 4.7. The (English translation of the) full questionnaire of the survey experiment is provided in the Appendix.

### 4.3.2 The sample

Our survey was quoted according to age and gender, which consequently lead to a representative age structure in the sample.[6] Treatment and control groups are also balanced along key variables like education, income, political ideology and so on. Around 92 % of the respondents were born in Germany. Our sample is slightly more educated and their mean income is lower than in the general population (probably because the sample did not include earners

[5] The first and the second treatment are separate events, and (potential) changes in preferences were separately surveyed.

[6] Potential respondents did not know that they were going to be asked for their views on inequality or redistribution. Selection into the survey, thus, did not *a priori* favor people with strong views or interest in these issues. Respondents spent on average five minutes on the survey, with a median time of $4'30''$. Given the moderate length of the survey, these answering times appear appropriate. Unfortunately, we have no information about attrition rates. For people who aborted the survey, no data were saved.

of very high incomes).[7] A comparison of selective main characteristics between the general German population and our survey sample can be seen in Table 4.A1 in the Appendix.

We dropped the first (net income below 400 €) and the hundredth percentile (net income above 5000 €) from our sample for data cleaning reasons. The remaining sample consists of 859 observations. The left-hand panel of Figure 4.1 shows the income distribution of our sample by income deciles, taken from the GSOEP, v29. A fully representative sample should exhibit a 10 % density in every decile. In our sample, low income deciles are somewhat over-represented, while high income deciles are underrepresented. Otherwise, the inaccuracies in the distribution of incomes are negligible.

To capture potential correlates of attitudes towards redistribution, we constructed a number of variables for our sample (see Table 4.A2 in the Appendix for a list). To measure whether the availability of social comparisons shapes perceptions and positions on income inequality, we defined dummy variable (*reference group*) with value of one when a respondent stated that his/her reference group encompasses all social classes.[8] This holds for 13 % of respondents; 26 % state to be mainly in contact with the lower class, 62 % with the middle class and 3 % with the upper class.

Bartels (2005, 2008) argues that perceptions of inequality are systematically shaped by political ideology, with conservatives being less aware of (changes in) inequality, even when controlling for their general political knowledge. We let respondents self-locate their ideological position on a scale from 1 ('left') to 10 ('right'), from which we constructed variable *ideology*.

The demand for redistribution can also be associated to individuals' views on the fairness of the income distribution. Following Corneo and Grüner (2002), we asked respondents (as in the ISSP) 'How important is hard work for getting ahead in life?', with five categories from 'essential' to 'not important at all'. We include this as a regressor (*hard work*), too.

Media consumption may be relevant, too. We asked respondents how often (daily, weekly, monthly, rarely or never) they used different media (newspaper, TV, Internet). In all, 75% of respondents watch news in TV or read news in the internet daily, and 37% read a daily newspaper. We constructed a variable *informed* to summarize all media usage, with greater numbers indicating higher levels of usage.

[7] We also checked whether or not results are robust against re-weighting our observations according to income deciles by six different age groups. Mean and median income increase noticeably, nevertheless, our results are robust against using sample weights. Main results of regressions using sample weights can be seen in Table 4.A8 in the Appendix.

[8] We asked this question at the end of the survey, after having uncovered the actual type of society.

## 4.4 Biases in self-assessments

### 4.4.1 Measurement and descriptives

The right-hand part of Figure 4.1 shows the distribution of our respondents across (actual) income deciles, based on their self-assessments. This distribution is considerably less dispersed than the objective one. Moreover, lower income groups tend to overestimate their relative income position while higher income groups tend to underestimate the relative income. If, as in Cruces et al. (2013), these biases are the result of respondents' flawed inferences from own social experiences with differences in incomes to the entire income distribution, our observations indicate a widespread underestimation.

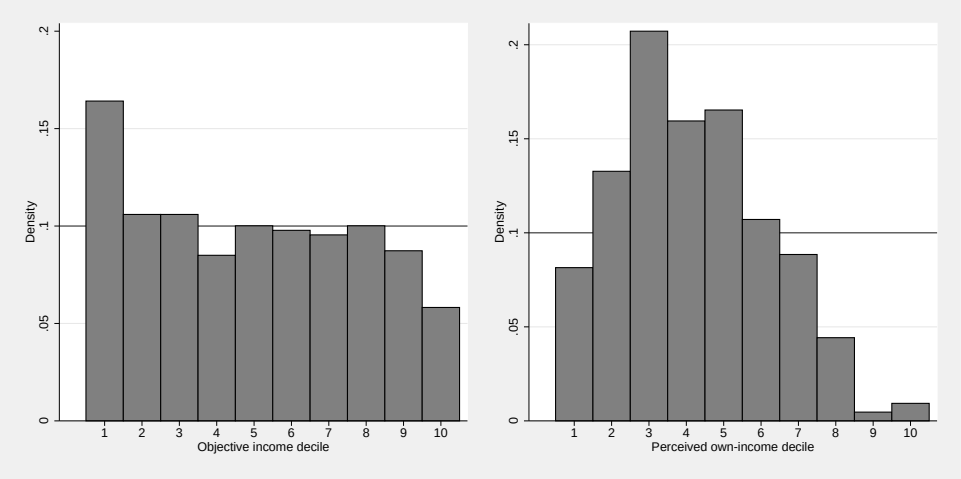



Figure 4.1: Distribution of objective and perceived income decile.

We defined as variable *bias* the difference between perceived and actual decile. A *negative [positive] bias* indicates an underestimation [overestimation] of one's income decile. Table 4.1 provides a detailed picture of respondents' self-positioning biases, sorted by actual income deciles. Column (1) shows that the average perceived own decile ranges from 3.106 (in the first decile) to 6.240 (in the 10th decile). In the middle of the income distribution the mean bias [column (2)] is relatively small, but it increases towards both ends. Perceptions of relatively poor respondents are positively based [columns (3) and (4)], while the relatively rich tend to underestimate their relative income position which leads to negative biases [columns (5) and (6)]. The distribution of biases is also shown in Figure 4.A1 in the Appendix.

In Table 4.2, we report correlates of perceived deciles other than objective relative income. As can be seen in column (1), the objective income rank is a statistically highly significant

Table 4.1: Self-positioning bias by income decile

| objective decile | (1) average perceived own decile | (2) mean bias | (3) proportion with positive bias | (4) average positive bias | (5) proportion with negative bias | (6) average negative bias |
|---|---|---|---|---|---|---|
| 1 | 3.106 | 2.106 | 0.695 | 3.031 | 0.000 | 0.000 |
| 2 | 3.330 | 1.330 | 0.582 | 2.547 | 0.154 | -1.000 |
| 3 | 3.725 | 0.725 | 0.418 | 2.684 | 0.319 | -1.241 |
| 4 | 4.055 | 0.055 | 0.397 | 1.828 | 0.438 | -1.531 |
| 5 | 4.174 | -0.826 | 0.174 | 1.600 | 0.640 | -1.727 |
| 6 | 4.369 | -1.631 | 0.131 | 1.455 | 0.810 | -2.250 |
| 7 | 4.695 | -2.305 | 0.061 | 1.200 | 0.805 | -2.955 |
| 8 | 4.930 | -3.070 | 0.012 | 1.000 | 0.965 | -3.193 |
| 9 | 4.947 | -4.053 | 0.000 | 0.000 | 1.000 | -4.053 |
| 10 | 6.240 | -3.760 | 0.000 | 0.000 | 1.000 | -3.760 |

*Notes:* Bias is defined as perceived income decile minus objective income decile. See Table A.1 for detailed definitions.

correlate. Due to the systematic bias, the regression coefficient is lower than one. This observation remains stable after including individual characteristics as age, gender, education level, and political ideology.

Perceived income positions are not correlated with age or gender. Regression coefficients are fairly small and not statistically significant. A higher education level – measured in highest degree – decreases the perceived relative income rank: a higher level of education level is positively correlated with a negative bias (underestimation of one's own income rank) and negatively correlated with a positive bias (overestimation of relative income).[9] The coefficient of *political ideology* is positive but close to zero, indicating that a more conservative ideology goes along with a slightly higher perception of one's relative income.

Table 4.2: Determinants of perceived own income decile

| | (1) | | (2) | |
|---|---|---|---|---|
| | Mean | Std. Err. | Mean | Std. Err. |
| objective decile | 0.275*** | (0.022) | 0.275*** | (0.023) |
| age | | | 0.0042 | (0.005) |
| women | | | -0.0238 | (0.125) |
| education | | | -0.107* | (0.062) |
| ideology | | | 0.0694** | (0.034) |
| constant | 2.818*** | (0.124) | 2.702*** | (0.411) |
| $R^2$ | 0.158 | | 0.168 | |
| $N$ | 859 | | 859 | |

*Notes:* Robust standard errors in parentheses: $***p<0.01, **p<0.05, *p<0.1$. Dependent variable: perceived own income decile. See Table A.1 for detailed definitions.

[9] Precise correlations between controls and bias groups are available on request.

There is no significant correlation between the self-positioning bias and the self-assessment of respondents' reference group, measured by variable *reference group*. Regressing informedness (i.e. variable *informed*) on bias groups, we observe, however, a significant negative correlation with positive bias and a significant positive correlation with negative bias. However, there is also a high correlation between *informed* and income; if we control for income, the significance of the correlations vanishes. We do not have evidence, thus, that respondents who are well informed about current affairs have a more precise picture of their income rank.

As respondents systematically fail to locate themselves in the income distribution, we want to know how sure they were in their answers. A mere 14% of respondents reported that they were sure or very sure about their self-positioning, 48% were somewhat sure and 38% not sure at all. Overall, people seem to know that they do not know very much. Interestingly, the reported levels of confidence do not vary across perceived income deciles. Therefore, we can refute the objection that respondents choose middle categories for their self-positioning if they have no clue.

To sum up: respondents know little about their relative income and they are aware of this fact.

## 4.5 Preferences for redistribution

### 4.5.1 Initial preferences

Even before the self-assessments we had asked respondents about their general opinion on redistribution in Germany. Answers were coded in seven categories, ranging from 1 ('There is too much effort to equalize incomes.') over 4 ('It is fine as it is.') to 7 ('Income inequality is far too high and should be reduced.'). We take respondents' answers as their revealed preference for more/less redistribution. An overwhelming majority of 83 % of the respondents asks for more redistribution (categories 5-7), 11 % are satisfied with the status quo (category 4) and merely 6 % think there is too much income equalization in Germany (categories 1-3).

This is a strong and surprising observation, and we had a more detailed look at respondents' preferences for redistribution. We first study the mean preferences for redistribution by income deciles. [10] As can be seen in column (1) of Table 4.3, mean preferences for redistribu-

[10] We report results for *perceived* income decile because perceptions might matter more for political preferences than the (unknown) actual position. Results for mean preferences in actual income deciles are

tion range from 4.125 in the top perceived decile to 6.100 in the lowest perceived decile. This indicates that there is a quite uniform (average) preference for *more* redistribution and greater income equality across all deciles of perceived income (recall that 4 signifies a preference for the status quo). Moreover, between the second and ninth decile, the average preferences for redistribution do not show much variation. Preferences are, thus, remarkably homogeneous across income groups. Moreover, we do not observe any differences in preferences for redistribution within and across the political spectrum. Especially, the correlation between preferences for redistribution and stated political ideology is very low ($rho = -0.16$). The generally very high popularity of more redistribution from left to right is also reflected in the programs of all major German parties (excluding, possibly, the small liberal party) that all advocate 'more' social justice.

These observations are in harmony with the pattern one gets from the ISSP. Summary statistics for answers from Germany can be seen in Table 4.A4, column (1) and Figure 4.A2. Again, mean preferences are quite similar across perceived income deciles: virtually everybody asks for more redistribution.[11]

### 4.5.2 Informed preferences

Preferences generally depend on the perceived relative position. If an information treatment just confirms individual perceptions, nothing should happen. But if the perception is initially wrong and then corrected by an information treatment, preferences might be updated.

First insights emerge from columns (2) and (3) in Table 4.3.[12] The columns report mean preferences for redistribution in the perceived income deciles for, respectively, treatment and control group. Differences are small, and the values do not visibly differ from the replies to the initial question, reported in column (1). Changes in preferences for redistribution by initial self-positioning bias can be seen in Figure 4.A4. Changes are shown for treatment and control group, separately. The graphs show that the magnitudes in changes are small across all degrees of misperceptions (the large values at the extreme ends are not very informative as only very few respondents erred that dramatically in their initial assessments).

To identify whether or not there is a treatment effect, we used both the simple first-difference

reported in Table 4.A3. They are qualitatively the same as for perceived deciles.

[11] Columns (2) and (3) in Table 4.A4 and Figure 4.A3 show that this phenomenon is not confined to Germany: the mean preferences for redistribution by perceived income decile for Sweden and Argentina – the two countries for which comparable studies exist (Cruces et al., 2013; Karadja et al., 2017) – also lie in a relatively small range.

[12] See columns (2) and (3) in Table 4.A3 for mean preferences by income decile.

Table 4.3: (Mean) Preferences for redistribution by perceived income decile

| | (1) initial preferences | | (2) 1st treatment (treated) | | (3) 1st treatment (control) | | (4) 2nd treatment (of the treated) | |
|---|---|---|---|---|---|---|---|---|
| perc. decile | Mean | Std. Err. | Mean | Std. Err. | Mean | Std. Err. | Mean | Std. Err. |
| 1 | 6.100 | (1.241) | 6.243 | (0.955) | 5.906 | (1.304) | 6.162 | (0.958) |
| 2 | 5.763 | (1.319) | 5.933 | (1.087) | 5.731 | (1.430) | 5.683 | (1.308) |
| 3 | 5.730 | (1.186) | 5.702 | (1.144) | 6.048 | (0.877) | 5.606 | (1.280) |
| 4 | 5.679 | (1.212) | 5.707 | (1.250) | 5.839 | (1.059) | 5.480 | (1.379) |
| 5 | 5.430 | (1.426) | 5.347 | (1.465) | 5.500 | (1.422) | 5.236 | (1.477) |
| 6 | 5.543 | (1.456) | 5.452 | (1.418) | 5.653 | (1.451) | 5.310 | (1.490) |
| 7 | 5.592 | (1.308) | 5.714 | (1.132) | 5.765 | (1.208) | 5.476 | (1.194) |
| 8 | 5.500 | (1.767) | 5.700 | (1.342) | 6.118 | (1.054) | 5.600 | (1.603) |
| 9 | 6.000 | (1.155) | 6.500 | (0.707) | 7.000 | (0.000) | 6.000 | (1.414) |
| 10 | 4.125 | (1.642) | 4.250 | (0.957) | 4.250 | (1.258) | 3.750 | (2.217) |

*Notes:* Preferences for redistribution are coded from 1 to 7. For more details see Table A.1.

estimator as well as a difference in differences estimator. As our sample size is too small, we cannot meaningfully estimate potential treatment effects for each pair of perceived and factual income decile. We, therefore, choose plausible larger subgroups and partitioned respondents into those who held no bias, a positive bias or a negative bias in their income assessment. For the 'no-bias-respondents' the information treatment just confirms their beliefs and we, thus, do not expect any treatment effect. But the information treatment (truthfully) may change the beliefs of respondents with a bias.

Results are reported in Table 4.4. Columns (1) to (3) show the average preferences for redistribution of those who, respectively, underestimated, correctly assessed, and overestimated their relative income positions. Panel A uses the full sample – and shows that the treatment did not generate any statistically significant effects, neither for simple differences nor for differences in differences. Furthermore, differences in differences coefficients are not only statistically insignificant, but also close to zero.

A plausible explanation for the lack of effect is, of course, that our information treatment – which should make most respondents conclude that inequality is more pronounced than they initially thought – further cemented their strong preference for redistribution (recall that more than 83% of the respondents stated a preference for more redistribution already at the outset).

To check whether the information treatment at least impacted on those who had initially not been for more redistribution, we restrict our sample to these respondents. This shrinks the number of observations dramatically. However, as reported in Panel B of Table 4.4, we do not observe any statistically significant difference between control and treatment group. Nevertheless, we cannot completely reject moderate differences with the statistical power

Table 4.4: (Perceived) distribution and preferences for redistribution: experimental results

| | (1) Negative Bias | | (2) No Bias | | (3) Positive Bias | |
|---|---|---|---|---|---|---|
| **Panel A: Full Sample** | | | | | | |
| Treatment group [obs.] | 5.694 | [248] | 5.696 | [69] | 5.679 | [131] |
| Control group [obs.] | 5.681 | [220] | 5.897 | [68] | 5.923 | [118] |
| Difference [s.e.] | 0.012 | [0.110] | -0.201 | [0.222] | -0.244 | [0.169] |
| Diff-in-Diff [s.e.] | 0.079 | [0.162] | -0.060 | [0.332] | 0.005 | [0.242] |
| **Panel B: Initial preference for less redistribution** | | | | | | |
| Treatment group [obs.] | 4.098 | [41] | 3.875 | [16] | 4.000 | [24] |
| Control group [obs.] | 3.897 | [39] | 4.000 | [8] | 3.950 | [20] |
| Difference [s.e.] | 0.200 | [0.257] | -0.125 | [0.552] | 0.050 | [0.479] |
| Diff-in-Diff [s.e.] | 0.249 | [0.329] | -0.750 | [0.697] | -0.108 | [0.570] |
| **Panel C: Above average bias** | | | | | | |
| Treatment group [obs.] | 5.631 | [122] | 5.696 | [69] | 5.435 | [46] |
| Control group [obs.] | 5.570 | [114] | 5.897 | [68] | 5.978 | [45] |
| Difference [s.e.] | 0.061 | [0.159] | -0.201 | [0.222] | -0.543* | [0.292] |
| Diff-in-Diff [s.e.] | 0.032 | [0.235] | -0.060 | [0.332] | -0.173 | [0.427] |
| **Panel D: Leftist attitude** | | | | | | |
| Treatment group [obs.] | 6.000 | [78] | 6.259 | [27] | 5.700 | [40] |
| Control group [obs.] | 5.989 | [90] | 5.885 | [26] | 6.119 | [42] |
| Difference [s.e.] | 0.011 | [0.157] | 0.375 | [0.282] | -0.419* | [0.280] |
| Diff-in-Diff [s.e.] | 0.830 | [0.237] | -0.001 | [0.414] | -0.020 | [0.427] |
| **Panel E: Hard work is important** | | | | | | |
| Treatment group [obs.] | 5.677 | [164] | 5.636 | [44] | 5.677 | [96] |
| Control group [obs.] | 5.711 | [152] | 5.744 | [39] | 6.108 | [83] |
| Difference [s.e.] | -0.034 | [0.133] | -0.107 | [0.309] | -0.431** | [0.189] |
| Diff-in-Diff [s.e.] | 0.045 | [0.197] | 0.013 | [0.458] | 0.007 | [0.272] |

*Notes:* Robust standard errors in parentheses. $^{***}$: $p < 0.01$, $^{**}$: $p < 0.05$, $^{*}$: $p < 0.1$. Dependent variable: preferences for redistribution. Columns show average preferences for redistribution by bias group. Respondents with negative [positive] bias underestimate [overestimate] their relative income rank. Initial preferences for less redistribution indicate an initial preference lower or equal to 4. Above average bias indicates a bias above mean bias (positive bias $> 2.5$; negative bias $< -2.8$).

we have.

In Panel C we restrict attention to respondents who initially held a large (i.e., above-average) bias, as these individuals might have had much reason to change their views, becoming aware of their great knowledge gap. Here, the first difference estimator in column (3) reports a statistically significant difference of stated preferences between control and treatment group, which vanishes, however, when diff-in-diff is implemented. That the first difference is non-zero in a statistically significant way is, thus, likely to be an artefact of having systematic differences among those members in treatment and control group who held a positive bias. Respondents with a leftist leaning (Panel D) do not show any treatment effect either. Neither do those who attach great importance to *hard work*, i.e. who (initially) considered the process of income generation as fair (Panel E). With exception of column 1 in Panel D, all diff-in-diff coefficients are not just statistically insignificant but close to zero, too.

Hence, overall preferences for redistribution proved to be immune against our informative update. Still, 26 % of treatment group members change their preferences upon treatment (only 14 % in the control group). Thus, we indeed observe a higher variation of preferences in the treatment group, but the difference is not statistically significant.[13] By design, we cannot say why the treatment was ineffective: according to knowledge-behavior gap theory (see Section 4.2), it might not have changed individuals' perceptions or, if it did, did not translate into changes in preferences for redistribution. Within the short time span of the survey, respondents may fail to update their beliefs on inequality or might not see enough reason to give up cherished views on the social meaning of inequality. Neither do we observe any impact of the respondents' degree of confidence in their initial self-assessment on their disposition to change (or not to change) their views towards redistribution after the information treatment.[14]

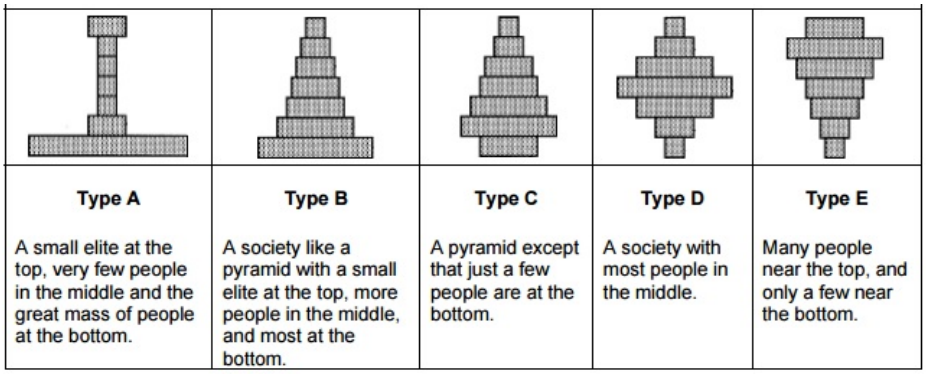
## 4.6 Perceived and preferred types of society

The dimensions of inequality discussed so far refer to a comparative view. We now examine perceptions and preferences for a different concept of inequality – social stratification –, based on a normative view of inequality. In a stylized way, the degree of social stratification

[13] From a technical point of view, the missing treatment effect is no surprise. Mean preferences for redistribution are uniformly distributed over income deciles. Thus, if we inform respondents about their self-positioning bias, the decile changes do not imply different preferences on average (see Table 4.A3).

[14] Whether a respondent was initially wrong (and might, thus, have felt uncomfortable with the initial view or its correction) or right (and might, thus, feel encouraged to reinforce the initial view) does not play any role. Neither does the specific way in which biases are measured. See Table 4.A9 Panel A in the Appendix.

in a society can be depicted by simple graphs. As in the ISSP questionnaire, we presented five types of society to our respondents (see Figure 4.2) and asked them to state (a) which type best describes German society today and (b) of which type they think Germany ought to be.



| Type A | Type B | Type C | Type D | Type E |
|---|---|---|---|---|
| A small elite at the top, very few people in the middle and the great mass of people at the bottom. | A society like a pyramid with a small elite at the top, more people in the middle, and most at the bottom. | A pyramid except that just a few people are at the bottom. | A society with most people in the middle. | Many people near the top, and only a few near the bottom. |

Figure 4.2: Types of society. *Source:* ISSP 2009 Social Inequality IV questionnaire.

### 4.6.1 Perceptions and preferences

Interpreting the society types in Figure 4.2 as representations of the income distribution, the type which best describes today's Germany is Type C. When asked about the actual type of the Germany society at the beginning of the survey, 29 % of respondents opted for Type C [see column (1) in Table 4.5]. About 57 % chose one of the more unequal Types A or B, and 15 % thought it was one of the more equal Types D or E. For reference, a random choice among these five types of society would lead to the right answer in 20 % of the time, i.e., the majority of respondents misjudge social stratification. Interestingly, they tend to overestimate inequality.[15]

If we turn to the 'What do you think Germany ought to be like'- question the picture reverses: more than 80 % of respondents think that the rather equal Types D and E are desirable [see column (1) in Table 4.6]. About 10 % vouch for Type C and a mere 7 % prefer the rather unequal Types A and B.

[15] Verify from column (1) in Table 4.A5 that responses in our sample are in line with those in the ISSP 2009. The same holds for the 'ought'-question; see column (2) in Table 4.A5.

### 4.6.2 Information treatment

Our treatment does not inform respondents about the actual type of the German society but only provides additional information about the income distribution. Still, this could have helped treated participants to improve their assessments. We therefore asked both the 'is' and the 'ought' question on stratification again, after the treatment. As can be seen from Tables 4.5 and 4.6 there are indeed small differences between treatment group [column (2)] and control group [column (3)].

Table 4.5: What type of society is Germany today?

| | (1) initial type today | (2) 1st treatment (treated) | (3) 1st treatment (control) |
|---|---|---|---|
| Type A | 21.65% | 26.34% | 21.90% |
| Type B | 34.92% | 29.91% | 32.36% |
| Type C | 28.52% | 27.23% | 30.90% |
| Type D | 10.71% | 11.83% | 9.49% |
| Type E | 4.19% | 4.69% | 5.35% |

Table 4.6: What do you think Germany ought to be like?

| | (1) initial type preferred | (2) 1st treatment (treated) | (3) 1st treatment (control) |
|---|---|---|---|
| Type A | 1.86% | 2.01% | 1.48% |
| Type B | 5.01% | 4.91% | 6.42% |
| Type C | 10.48% | 13.39% | 12.10% |
| Type D | 63.33% | 62.28% | 60.49% |
| Type E | 19.32% | 17.41% | 19.51% |

For a more detailed analysis of these differences we again estimated first differences and difference in differences. Tables 4.A6 and 4.A7 in the Appendix show the results for, respectively, the 'is'-question and the 'ought'-question.[16] They convey similar messages as Table 4.4 in the previous section: there are no significant differences between treatment and control group, and the full sample specification coefficients are also close to zero. This holds irrespective of whether individuals overestimated, correctly estimated or underesti-

[16] As in Section 4.5, results are presented by bias group because of potentially heterogeneous treatment effects. Furthermore, we ran estimates for each 'before treatment'-type and for the full sample. Diff-in-diff is only applied in the latter case, because both methods – first difference and diff-in-diff – obviously coincide in the former ones.

mated their income position, prior to the treatment. Hence, we were either unable to alter our respondents' beliefs or changes in beliefs did not translate into changes in preferences.

## 4.7 Net contributor or beneficiary?

In a second treatment, we triggered pocketbook concerns. In the spirit of rational choice-approaches to income redistribution as in Meltzer and Richard (1981), the idea was to check whether learning that one belongs to the net payers or net beneficiaries in the German tax-transfer system affects one's views on redistribution. For example, high-income earners who tend to underestimate their relative position might change their preference for more redistribution once they get informed that they would financially suffer from further inequality reduction.

The treatment informs individuals about their 'payer status' where we (generously) described individuals up to the 65th percentile as 'net receivers', individuals between the 65th and 75th percentile as 'rather neutral', and individuals above the 75th percentile of the income distribution as 'net payers'; these brackets were calculated from GSOEP data by subtracting (equivalized) net incomes from (equivalized) market incomes. While learning their rank in the income distribution in the first treatment – as well as in Cruces et al. (2013) and Karadja et al. (2017) – might provide respondents with a rough idea on whether they benefit or suffer from the tax-transfer system, our second treatment captures this more directly.

Since treatment effects are likely to be heterogeneous again (e.g. they might vary with payer status), we generate dummy variable *pay* which takes value 1 if the respondent belongs to the seventh decile or higher and zero otherwise.[17] About 34 % of the (treated) respondents are the net payers. Among these, 94 % underestimated their relative position in the income distribution, 4 % held no bias and 2 % overestimated their relative income.

The second information treatment was only (randomly) applied to those in the previous treatment group, i.e., all individuals knew about their relative income position. Therefore, our empirical analysis focuses on the first difference between stated preferences before and after the second information treatment.

Regressing this difference in preferences on *pay* provides a statistically highly significant coefficient of negative sign, as can be seen in column (1) of Table 4.7: learning to be a net

[17] We used the 70th percentile rather than the more precise 75th percentile as the threshold because we framed the entire survey in deciles (e.g., respondents were informed that they belonged to the seventh or eighth decile). Our results also hold if we set the threshold at the eighth decile.

payer decreases one's preference for redistribution.

Interestingly, this change of mind occurs irrespective of respondents' political leanings and fairness perceptions: the sign and magnitude of preference changes when being informed about one's net payer status do not vary when we control for political attitudes and the *hard work*-variable [see columns (2) and (3) in Table 4.7].

Table 4.7: Net payer/beneficiary and preferences for redistribution

| | (1) | | (2) | | (3) | |
|---|---|---|---|---|---|---|
| | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| pay | -0.251*** | (0.001) | -0.251*** | (0.073) | -0.257*** | (0.073) |
| hard work | | | -0.087 | (0.074) | | |
| ideology | | | | | 0.017 | (0.018) |
| constant | -0.078* | (0.042) | -0.019 | (0.066) | -0.160 | (0.101) |
| $R^2$ | 0.026 | | 0.029 | | 0.028 | |
| $N$ | 448 | | 448 | | 448 | |

*Notes:* Robust standard errors in parentheses: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$. Dependent variable: change in preferences which is defined as after-treatment preference minus before-treatment preferences. See Table A.1 for detailed definitions.

In summary, learning that they are richer or poorer than they had previously thought has no effect on individuals' demand for redistribution – but learning that they are likely to lose from redistribution does decrease their demand. A potential explanation (beyond the scope of our survey) is that, unless primed so, people do not think about redistribution in terms of financial costs and benefits but in general and principled terms of good or fair societies. At this abstract level, the own income position might not matter much when assessing the status quo and expressing a normative view, leading to a weak correlation between income rank and preferences. Once the veil of ignorance is lifted – which happens in the second information treatment – pocketbook concerns set in.

The initial information treatment had no effect: those who learn (or are assured) that they are relatively rich obviously did not consider or grasp the personal financial implications of this (new) information. This might be understandable, given that at this stage of the survey the financing of the welfare state had not played any role at all. Once the (personalized) price tag on redistribution becomes salient, rich respondents partly re-consider their policy preferences.

The inertia most (rich) respondents show after the first treatment and their preference shift after the second are in line with a 'cheap talk'-interpretation of preferences towards redistribution: people hold cherished views on how large inequality is and ought to be, and they do not change these 'expressive' views until they are given reason to think through its conse-

quences for themselves.

## 4.8 Conclusions

All in all, our results show that Germans are poorly informed about their own relative income, that their perception of social stratification is just slightly better, and that they are aware of their ignorance. Still, they have outspoken preferences for more redistribution. A surprising observation from our survey is the stable and strong preferences for more redistribution across all incomes.[18] This is in contrast to what one would expect, in particular towards the top of the income distribution and in a country that, in international comparison, a large welfare state with a considerable degree of progressivity.

Part of the puzzle might be resolved when noticing that the average survey participant from income deciles 8 to 10 locates herself between deciles 5 and 6 and, thus, holds a massively negative self-perception bias. Obviously, these comparatively rich people believe that there is a considerable share of the population with (even) higher incomes – and that there are, thus, substantial resources available that could be redistributed downwards. Hence, additional redistribution looks easily feasible. Moreover, underestimating their relative position, the upper income groups might not think of themselves as massive net contributors to redistributive schemes (some might even hope to benefit financially from redistribution), which makes a greater degree egalitarianism appear costless to themselves.[19]

Given their preference for more redistribution we expected that it would be mainly those relatively rich respondents who underestimate their actual income position who reacted to the information treatment by expressing lower enthusiasm for redistribution. This did not happen, however. A tentative explanation – apart from the possibility that the information treatment did not help respondents to better understand inequality – would be that high-income earners indeed harbor sincere egalitarian or pro-poor preferences. Inferring from the information treatment how big the gap between rich and poor in Germany actually is or how low incomes in the poorer strata really are, might strengthen their desire for more redistribution, even after taking potential pocketbook concerns into account.

Our results trigger the question why we do not observe more redistribution, given that all

[18] By contrast, Cruces et al. (2013, Figure 4) find a *u*-shaped pattern in the preference for more redistribution over the Argentinian income distribution.

[19] Observe from Table 4.3 that some respondents who believe to belong to the top deciles of the income distribution indeed do ask for more redistribution (38 respondents locating themselves in the eighth decile, four in the ninth, and eight in the top). Still there is no bias resulting from a potentially above-average leftist ideology in this sub-sample.

Germans seem to cherish it. Tentative answers are: first, the preference for more egalitarianism (which also shows up in the platforms of all major political parties in Germany) is mostly cheap talk – if programs are actually proposed, pocketbook concerns override well-intentioned preference statements. Our experiment supports this explanation: already informational clues towards net payer status weaken the preference for redistribution noticeably. Second, the 'political system' (government, parliament, lobby groups etc.) holds different preferences on redistribution than the citizenry. As there is no direct voting (on redistribution) in Germany, political processes might produce results that deviate from what a popular vote would dictate. Third, financial feasibility and government budget constraints limit the scope for more redistribution, even if it is wished for by voters.

(Mis-)Perceptions of reality in the citizenry matter in democracies: normative views on the desirability (or lack thereof) of policy changes – more or less redistribution, say – are shaped, among others, by perceptions of the status quo. Distorted perceptions might lead to biased political choices. The links between citizens' views and preferences and actual redistribution policies certainly deserve greater attention.

## 4.9 Appendix

Table 4.A1: Comparison of survey respondents and population

| | (1) Survey | | (2) Census (2011) |
|---|---|---|---|
| | Mean | Std. Err. | Mean |
| age (18-70) | 45.2 | (14.541) | 44.2 |
| women | 0.505 | (0.500) | 0.512 |
| household net income (monthly) | 2405 | (2319) | 2988 |
| primary education | 0.002 | (0.048) | 0.047 |
| lower secondary education | 0.112 | (0.315) | 0.356 |
| secondary education | 0.359 | (0.480) | 0.269 |
| higher secondary education | 0.527 | (0.500) | 0.283 |
| retired | 0.212 | (0.409) | 0.237 |

*Source:* Own survey and micro census 2011.

Table 4.A2: Variable definitions and descriptive statistics

| Variable | Definition | Mean | Std. Dev. |
|---|---|---|---|
| equiv. household net income | (Monthly) Net income divided by equivalence weight based on the modified OECD scale. | 1461.25 | 745.88 |
| objective income decile | Respondent's relative income rank corresponding to the deciles of the GSOEP v29 (equivalence weighted). | 4.960 | 2.886 |
| perceived own income decile | Respondent's stated perceived own decile. Survey question: What is the share of households in Germany that have a lower standard of living than yours? Answer categories were given in deciles. | 4.184 | 1.998 |
| bias | Perceived own income decile minus objective income decile. | -0.774 | 2.781 |
| preference for redistribution | Respondent's stated attitude towards actual income inequality (scale ranges from 1 to 7): (1) there is too much effort to equalize incomes, (4) satisfied with status quo, (7) there should be much more effort to equalize incomes. | 5.651 | 1.341 |
| type today | Survey question: Which type (see Figure 4.2) best describes German society today? (1) Type A, (2) Type B, (3) Type C, (4) Type D, (5) Type E. | 2.409 | 1.069 |
| preferred type | Survey question: Which type (see Figure 4.2) the German society ought to be like? (1) Type A, (2) Type B, (3) Type C, (4) Type D, (5) Type E. | 3.932 | 0.814 |
| pay | Indicator variable equal to 1 if respondents objective income decile is 7 or higher. | 0.341 | 0.474 |
| informed | Sum of respondents stated (news) media consumption. We asked for news in TV, internet and newspaper, response categories: (1) never, (2) seldom, (3) monthly, (4) weekly, (5) daily. | 12.744 | 2.287 |
| confidence | How confident respondent feels with her answer on the own income decile (1) not sure, (2) somewhat sure, (3) sure, (4) very sure | 1.790 | 0.757 |
| confident | Indicator variable equal to 1 if confidence is (2), (3), or (4) | 0.618 | 0.486 |
| reference group | Indicator variable equal to 1 if the respondent states that she hast friends from all social classes. | | |
| ideology | Respondent's stated political leaning on a range from (1) left to (10) right | 5.013 | 1.875 |
| left | Indicator variable equal to 1 if ideology is equal or lower (4) | 0.484 | 0.500 |
| hard work | Indicator variable equal to 1 if respondent states that hard work is important to get ahead in live. Survey question: How important is hard work to get ahead in live?: (1) essential, (2) very important, (3) important, (4) somewhat important, (5) not important. | 0.675 | 0.469 |
| age | Age in years. | 45.213 | 14.541 |
| women | Indicator variable equal to 1 if respondent is female. | 0.505 | 0.500 |
| education | respondent's highest degree: (1) primary education, (2) lower secondary education, (3) secondary education, (4) higher secondary education (Fachhochschulreife), (5) higher secondary education (Abitur) | 3.794 | 1.081 |

*Notes:* $N = 859$ for all variables.

Table 4.A3: (Mean) Preferences for redistribution by income decile

| | (1) initial preferences | | (2) 1st treatment (treated) | | (3) 1st treatment (control) | | (4) 2nd treatment (of the treated) | |
|---|---|---|---|---|---|---|---|---|
| decile | Mean | Std. Err. | Mean | Std. Err. | Mean | Std. Err. | Mean | Std. Err. |
| 1 | 5.801 | (1.410) | 5.920 | (1.217) | 5.831 | (1.485) | 5.813 | (1.302) |
| 2 | 6.011 | (1.260) | 5.867 | (1.198) | 6.022 | (1.252) | 5.756 | (1.417) |
| 3 | 5.670 | (1.367) | 5.551 | (1.355) | 5.976 | (1.129) | 5.449 | (1.542) |
| 4 | 5.904 | (1.238) | 5.750 | (1.368) | 6.024 | (0.987) | 5.656 | (1.405) |
| 5 | 5.663 | (1.184) | 5.556 | (1.120) | 6.025 | (0.974) | 5.600 | (1.031) |
| 6 | 5.500 | (1.303) | 5.780 | (1.250) | 5.529 | (1.107) | 5.700 | (1.233) |
| 7 | 5.573 | (1.248) | 5.762 | (1.246) | 5.718 | (1.169) | 5.476 | (1.348) |
| 8 | 5.453 | (1.621) | 5.523 | (1.577) | 5.595 | (1.547) | 5.136 | (1.564) |
| 9 | 5.520 | (1.107) | 5.571 | (0.966) | 5.606 | (1.059) | 5.143 | (1.458) |
| 10 | 5.060 | (1.420) | 5.292 | (1.083) | 5.230 | (1.306) | 5.167 | (1.167) |

*Notes:* Preferences for redistribution are coded from 1 to 7. For more details see Table A.1.

Table 4.A4: (Mean) Preferences for redistribution: ISSP 2009

| | (1) Germany | | (2) Argentina | | (3) Sweden | |
|---|---|---|---|---|---|---|
| perceived decile | Mean | Std. Err. | Mean | Std. Err. | Mean | Std. Err. |
| 1 | 4.750 | (0.866) | 4.310 | (0.541) | 4.636 | (0.505) |
| 2 | 4.667 | (0.620) | 4.167 | (0.794) | 4.385 | (0.768) |
| 3 | 4.713 | (0.580) | 4.339 | (0.712) | 4.236 | (0.860) |
| 4 | 4.600 | (0.670) | 4.274 | (0.676) | 4.395 | (0.786) |
| 5 | 4.460 | (0.720) | 4.236 | (0.738) | 4.157 | (0.837) |
| 6 | 4.351 | (0.810) | 4.168 | (0.833) | 3.987 | (0.868) |
| 7 | 4.184 | (0.876) | 4.286 | (0.749) | 3.600 | (1.068) |
| 8 | 4.071 | (0.956) | 4.436 | (0.640) | 3.518 | (1.210) |
| 9 | 4.071 | (1.141) | 4.222 | (0.833) | 3.455 | (1.368) |
| 10 | 4.500 | (1.000) | 5.000 | (0.000) | 3.571 | (1.505) |

*Source:* ISSP 2009 Social Inequality IV.
*Notes:* Preferences for redistribution are coded from 1 to 5. survey question: 'Differences in income in <R's country> are too large.' (5) strongly agree (4) agree (3) neither agree nor disagree (2) disagree (1) strongly disagree. See Engelhardt and Wagener (2014) for the perceived income decile in the ISSP.

Table 4.A5: Answers ISSP 2009 (for Germany)

| | (1) Type Today | (2) Type Preferred |
|---|---|---|
| Type A | 18.80% | 1.49% |
| Type B | 35.38% | 10.36% |
| Type C | 23.03% | 18.21% |
| Type D | 18.57% | 57.06% |
| Type E | 4.22% | 12.87% |
| N | 1,255 | 1,274 |

*Source:* ISSP 2009 Social Inequality IV.

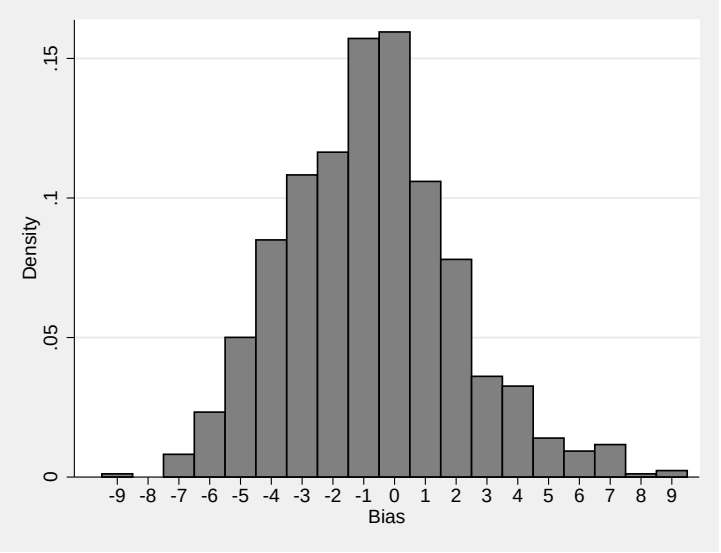



Figure 4.A1: Distribution of variable *bias* in our sample (see Table A.1 for definition).

Table 4.A6: Perceived types today: experimental results

| | (1) Negative Bias | | (2) No Bias | | (3) Positive Bias | |
|---|---|---|---|---|---|---|
| **Type A** | | | | | | |
| Treatment group [obs.] | 1.264 | [53] | 1.111 | [18] | 1.394 | [33] |
| Control group [obs.] | 1.200 | [40] | 1.467 | [15] | 1.222 | [27] |
| Difference [s.e.] | 0.064 | [0.143] | -0.356 | [0.277] | 0.172 | [0.227] |
| **Type B** | | | | | | |
| Treatment group [obs.] | 2.107 | [75] | 2.154 | [26] | 2.220 | [50] |
| Control group [obs.] | 2.025 | [79] | 1.957 | [23] | 2.149 | [47] |
| Difference [s.e.] | 0.081 | [0.107] | 0.197 | [0.188] | 0.071 | [0.182] |
| **Type C** | | | | | | |
| Treatment group [obs.] | 2.868 | [76] | 2.867 | [15] | 2.939 | [33] |
| Control group [obs.] | 3.000 | [76] | 2.833 | [24] | 2.857 | [21] |
| Difference [s.e.] | -0.132 | [0.870] | 0.033 | [0.180] | 0.082 | [0.166] |
| **Type D** | | | | | | |
| Treatment group [obs.] | 3.541 | [37] | 3.625 | [8] | 3.889 | [9] |
| Control group [obs.] | 3.905 | [21] | 3.750 | [4] | 3.769 | [13] |
| Difference [s.e.] | -0.364* | [0.190] | -0.125 | [0.314] | 0.120 | [0.352] |
| **Type E** | | | | | | |
| Treatment group [obs.] | 4.714 | [7] | 3.500 | [2] | 3.000 | [6] |
| Control group [obs.] | 4.500 | [8] | 5.000 | [2] | 4.182 | [11] |
| Difference [s.e.] | 0.214 | [0.564] | -1.500 | [1.500] | -1.182 | [0.846] |
| **Full Sample** | | | | | | |
| Treatment group [obs.] | 2.448 | [248] | 2.246 | [69] | 2.344 | [131] |
| Control group [obs.] | 2.473 | [224] | 2.353 | [68] | 2.429 | [119] |
| Difference [s.e.] | -0.026 | [0.100] | -0.107 | [0.179] | -0.085 | [0.154] |
| Diff-in-Diff [s.e.] | -0.046 | [0.138] | -0.044 | [0.251] | 0.086 | [0.211] |

*Notes:* Robust standard errors in parentheses: $^{***}$: $p < 0.01$, $^{**}$: $p < 0.05$, $^{*}$: $p < 0.1$. Dependent variable: type today. Columns show average preferences for redostribution by bias group. Respondents with negative [positive] bias underestimate [overestimate] their relaitve income rank.

Table 4.A7: Preferred society types: experimental results

| | (1) Negative Bias | | (2) No Bias | | (3) Positive Bias | |
|---|---|---|---|---|---|---|
| **Type A** | | | | | | |
| Treatment group [obs.] | 1.000 | [2] | —— | [——] | 1.625 | [8] |
| Control group [obs.] | 1 | [2] | 1.000 | [1] | 2.333 | [3] |
| Difference [s.e.] | —— | [——] | —— | [——] | —— | [——] |
| **Type B** | | | | | | |
| Treatment group [obs.] | 2.500 | [10] | 3.000 | [2] | 2.462 | [13] |
| Control group [obs.] | 2.000 | [11] | 2.000 | [2] | 2.000 | [5] |
| Difference [s.e.] | 0.500* | [0.256] | —— | [——] | 0.462 | [0.400] |
| **Type C** | | | | | | |
| Treatment group [obs.] | 3.148 | [27] | 3.375 | [8] | 3.000 | [13] |
| Control group [obs.] | 2.947 | [19] | 3.143 | [7] | 3.143 | [14] |
| Difference [s.e.] | 0.201 | [0.145] | 0.232 | [0.312] | -0.143 | [0.101] |
| **Type D** | | | | | | |
| Treatment group [obs.] | 3.927 | [164] | 3.957 | [46] | 3.946 | [74] |
| Control group [obs.] | 3.918 | [147] | 4.024 | [41] | 3.956 | [68] |
| Difference [s.e.] | 0.008 | [0.043] | -0.068 | [0.090] | -0.010 | [0.058] |
| **Type E** | | | | | | |
| Treatment group [obs.] | 4.867 | [45] | 4.769 | [13] | 4.826 | [23] |
| Control group [obs.] | 4.707 | [41] | 4.750 | [16] | 4.750 | [28] |
| Difference [s.e.] | 0.159 | [0.128] | 0.019 | [0.242] | 0 .076 | [0.182] |
| **Full Sample** | | | | | | |
| Treatment group [obs.] | 3.931 | [248] | 4.014 | [69] | 3.718 | [131] |
| Control group [obs.] | 3.860 | [220] | 4.000 | [67] | 3.924 | [118] |
| Difference [s.e.] | 0.072 | [0.072] | 0.014 | [0.130] | -0.206* | [0.118] |
| Diff-in-Diff [s.e.] | 0.069 | [0.099] | 0.029 | [0.178] | 0.057 | [0.171] |

*Notes:* Robust standard errors in parentheses: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$. Dependent variable: type preferred. Columns show average preferences for redistribution by bias group. Respondents with negative [positive] bias underestimate [overestimate] their relative income rank.

Table 4.A8: Preferences for redistribution and perceived/preferred types of society: weighted sample

| | (1) Negative Bias | | (2) No Bias | | (3) Positive Bias | |
|---|---|---|---|---|---|---|
| **Panel A: Preferences for redistribution** | | | | | | |
| Treatment group [obs.] | 5.604 | [248] | 5.680 | [69] | 5.688 | [131] |
| Control group [obs.] | 5.609 | [220] | 5.940 | [68] | 5.936 | [118] |
| Difference [s.e.] | -0.005 | [0.135] | -0.260 | [0.237] | -0.248 | [0.173] |
| Diff-in-Diff [s.e.] | 0.066 | [0.198] | -0.021 | [0.353] | 0.012 | [0.249] |
| **Panel B: Perceived types of society today** | | | | | | |
| Treatment group [obs.] | 2.479 | [248] | 2.220 | [69] | 2.402 | [131] |
| Control group [obs.] | 2.513 | [224] | 2.396 | [68] | 2.363 | [119] |
| Difference [s.e.] | -0.034 | [0.112] | -0.176 | [0.187] | 0.039 | [0.157] |
| Diff-in-Diff [s.e.] | -0.087 | [0.154] | -0.024 | [0.261] | 0.143 | [0.216] |
| **Panel C: Preferred types of society** | | | | | | |
| Treatment group [obs.] | 3.942 | [248] | 3.997 | [69] | 3.709 | [131] |
| Control group [obs.] | 3.835 | [220] | 4.056 | [67] | 3.921 | [118] |
| Difference [s.e.] | 0.107 | [0.076] | -0.059 | [0.195] | -0.212 | [0.130] |
| Diff-in-Diff [s.e.] | 0.044 | [0.105] | 0.049 | [0.270] | 0.041 | [0.187] |

*Notes:* Robust standard errors in parentheses. $^{***}$: $p < 0.01$, $^{**}$: $p < 0.05$, $^{*}$: $p < 0.1$. Regressions in Panel A recap regressions from Panel A in Table 4 but use sample weights. Panel B is the sample-weights analogue to Table A.6 (full sample). Panel C is the (sample weights) analogue to Table A.7 (full sample).

Table 4.A9: Changes of preferences for redistribution after treatment

**Panel A: Changes of preferences for redistribution after 1st treatment**

| | (1) | | (2) | | (3) | |
|---|---|---|---|---|---|---|
| positive bias | -0.005 | (0.111) | -0.007 | (0.112) | -0.007 | (0.112) |
| negative bias | 0.130 | (0.103) | 0.131 | (0.103) | 0.129 | (0.103) |
| nonconfident | – | | -0.045 | (0.076) | -0.045 | (0.076) |
| ideology | – | | – | | 0.005 | (0.019) |
| socio-economic controls | ✓ | | ✓ | | ✓ | |
| constant | 0.516** | (0.241) | 0.527** | (0.242) | 0.497* | (0.266) |
| $N$ | 448 | | 448 | | 448 | |
| $R^2$ | 0.022 | | 0.023 | | 0.023 | |

**Panel B: Changes of preferences for redistribution after 2nd treatment**

| | (1) | | (2) | | (3) | |
|---|---|---|---|---|---|---|
| pay | -0.207** | (0.090) | -0.206** | (0.091) | -0.213** | (0.091) |
| positive bias | -0.143 | (0.109) | -0.142 | (0.109) | -0.145 | (0.109) |
| negative bias | -0.179 | (0.109) | -0.180* | (0.109) | -0.184* | (0.109) |
| nonconfident | – | | 0.011 | (0.075) | 0.011 | (0.075) |
| ideology | – | | – | | 0.018 | (0.019) |
| socio-economic controls | ✓ | | ✓ | | ✓ | |
| constant | -0.054 | (0.239) | -0.056 | (0.240) | -0.163 | (0.263) |
| $N$ | 448 | | 448 | | 448 | |
| $R^2$ | 0.033 | | 0.033 | | 0.035 | |

**Panel C: Preference changes after 2nd treatment – alternative definitions of biases and interaction effects**

| | (1) | | (2) | | (3) | | (4) | |
|---|---|---|---|---|---|---|---|---|
| pay | -0.181* | (0.102) | -0.179* | (0.103) | -0.189* | (0.104) | -0.257* | (0.150) |
| positive bias (no dummy) | -0.042 | (0.029) | -0.041 | (0.029) | -0.0415 | (0.029) | -0.046 | (0.031) |
| interaction 1 | – | | – | | – | | 0.639 | (0.444) |
| negative bias (no dummy) | 0.043 | (0.0.027) | 0.044 | (0.028) | -0.043 | (0.027) | 0.048 | (0.045) |
| interaction 2 | – | | – | | – | | -0.021 | (0.057) |
| nonconfident | – | | 0.010 | (0.075) | 0.009 | (0.075) | 0.003 | (0.075) |
| ideology | – | | – | | 0.017 | (0.019) | 0.017 | (0.019) |
| socio-economic controls | ✓ | | ✓ | | ✓ | | ✓ | |
| constant | -0.079 | (0.233) | -0.081 | (0.234) | -0.180 | (0.259) | -0.155 | (0.261) |
| $N$ | 448 | | 448 | | 448 | | 448 | |
| $R^2$ | 0.035 | | 0.035 | | 0.037 | | 0.041 | |

*Notes:* Robust standard errors in parentheses. $^{***}$: $p < 0.01$, $^{**}$: $p < 0.05$, $^{*}$: $p < 0.1$. All estimations are based on the treatment group sample. The *dependent variables in Panels A and B* are the differences in the preference for redistribution after and before, respectively, treatment 1 and treatment 2; positive values indicate increased preference of redistribution. In Panels A and B 'no bias'-respondents are the reference group of bias types. *Interaction 1 (2)* is the coefficient resulting from interacting pay and positive (negative) bias. *Socio-economic controls* are age, sex, and education level.

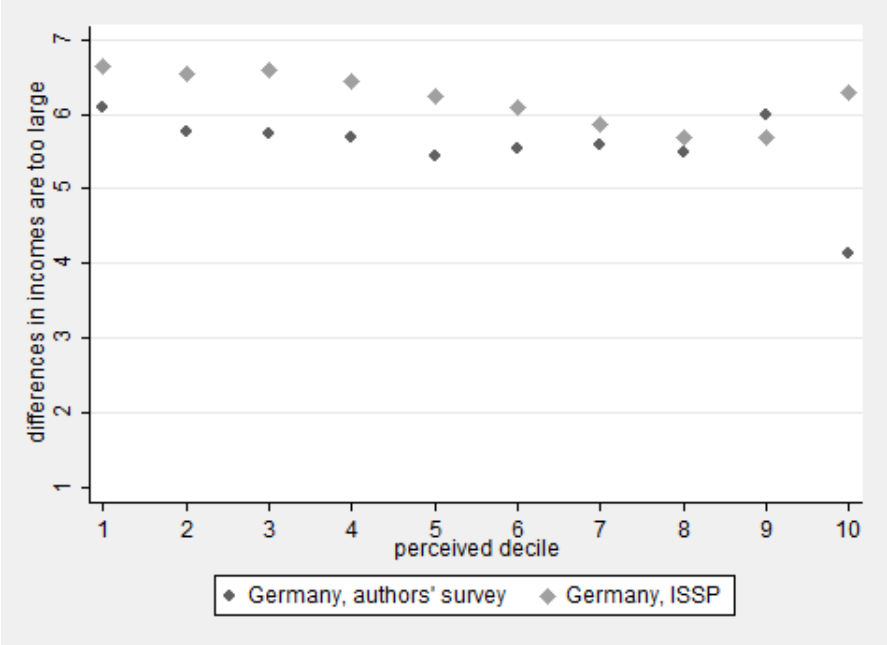



Figure 4.A2: Germans mean preferences for redistribution by perceived income decile.
*Note:* Comparison of ISSP and authors' survey Preferences are normalized to $[1,7]$.

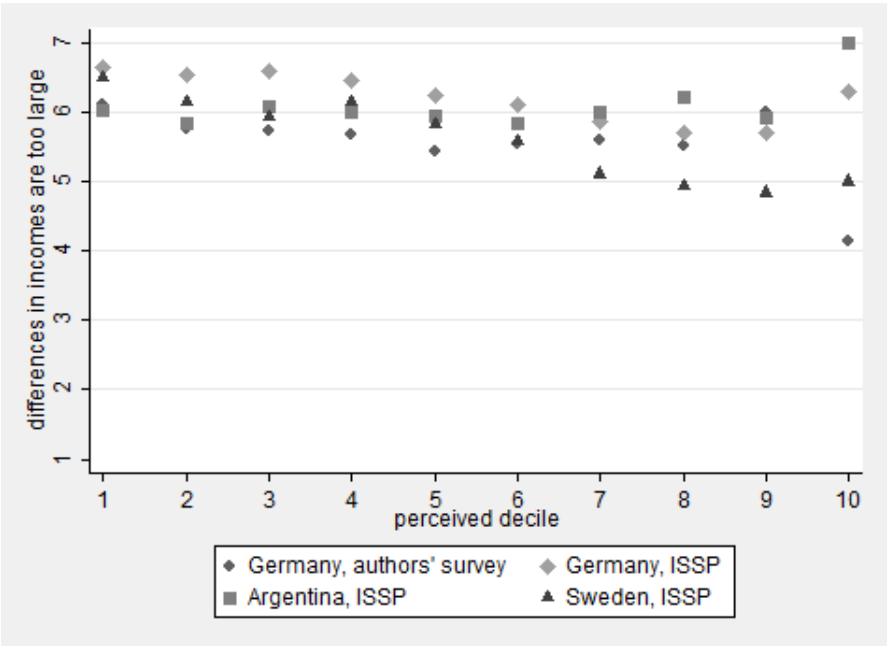



Figure 4.A3: Mean preferences for redistribution by perceived income decile.
*Notes:* Comparison of ISSP and authors' survey. Preferences are normalized to $[1,7]$.

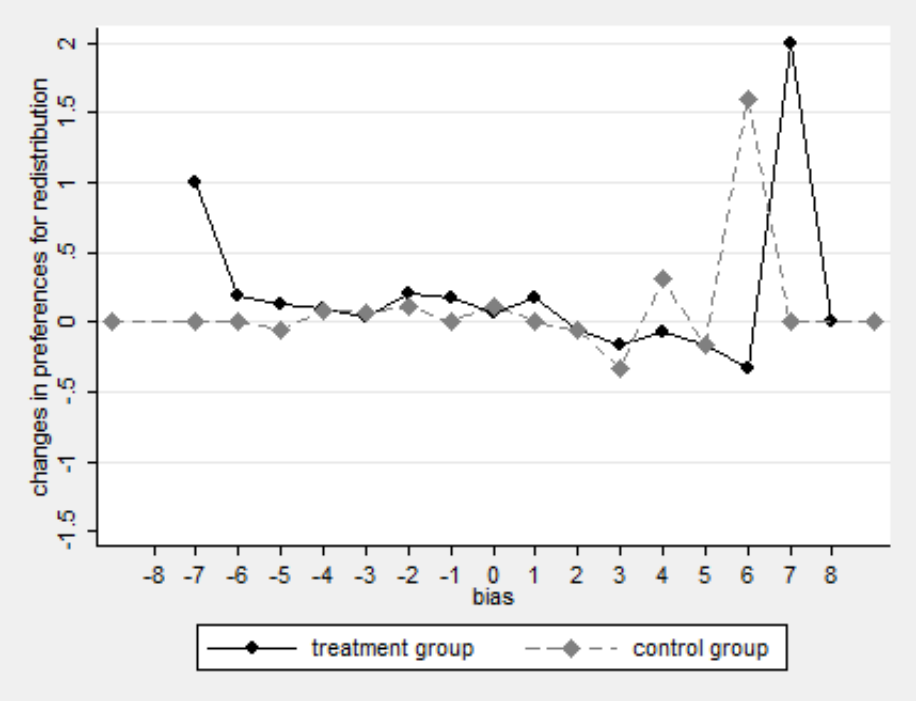



Figure 4.A4: Mean change in preferences for redistribution by initial self-positioning bias.

## Questionnaire

1. What is your attitude towards actual income inequality in Germany?

   7-point scale: 1 (There is too much effort to equalize incomes.) – 4 (I'm satisfied with status quo.) – 7 (There should be much more effort to equalize incomes.)

2. Which type best describes German society today? [Show Figure 2]

3. Which type the German society ought to be like? [Show Figure 2]

4. [Detailed explanation of the concept of equivalised disposable incomes.]

   What was your average monthly disposable household income last year?

   How many people aged 14 years or older do live in your household?

   How many children younger than 14 years old do live in your household?

5. Please make a guess - based on your equivalised monthly household income of [show calculated equivalised disposable income] Euro - how high the share of households in Germany with a lower equivalised monthly household income than yours is:

   10/20/30/40/50/60/70/80/90/100 percent [set of responses]

6. How sure are you about your answer to the previous question?

   not sure/somewhat sure/sure/very sure [set of responses]

*** CONTROL GROUP ONLY **********

7. What is your attitude towards actual income inequality in Germany?

   7-point scale: 1 (There is too much effort to equalize incomes.) – 4 (I'm satisfied with status quo.) – 7 (There should be much more effort to equalize incomes.)

8. Which type best describes German society today? [Show Figure 2]

9. Which type the German society ought to be like? [Show Figure 2]

[Give respondent information about actual relative position in the income distribution and whether she is a net payer or net receiver. This is not relevant for the survey experiment.]

*** TREATMENT GROUP ONLY **********

[INFORMATION TREATMENT 1: Inform respondent about her actual relative position in the income distribution.]

10. What is your attitude towards actual income inequality in Germany?

    7-point scale: 1 (There is too much effort to equalize incomes.) – 4 (I'm satisfied with status quo.) – 7 (There should be much more effort to equalize incomes.)

11. Which type best describes German society today? [Show Figure 2]

12. Which type the German society ought to be like? [Show Figure 2]

[INFORMATION TREATMENT 2: Inform respondent whether she is a net payer or net receiver.]

13. What is your attitude towards actual income inequality in Germany?

    7-point scale: 1 (There is too much effort to equalize incomes.) – 4 (I'm satisfied with status quo.) – 7 (There should be much more effort to equalize incomes.)

*** CONCLUDING QUESTIONS (ALL) **********

14. Redistributional arrangements do reduce income inequality in Germany. What is your attitude towards these redistributional arrangements?

    7-point scale: 1 (There is too much redistribution in Germany.) – 4 (I'm satisfied with status quo.) – 7 (There is not enough redistribution in Germany.)

15. In politics, there is a left wing and a right wing. If, on the following scale, 1 stands for the left wing and 10 for the right wing, where would you place yourself? [10-point scale]

16. How important is hard work to get ahead in live?

    very important/important/fairly important/ not very important/ very important [set of responses]

17. Type C best describes the German society today [Show Figure of type C]. Which social classes are represented in your personal surroundings (e.g. friends, colleagues, relatives)?

    all social classes/ mainly the lower class/ mainly the middle class/mainly the upper class [set of responses]

18. There are several ways to get up-to-date news about Germany and the world. Please tell us, how often you use the following sources: Newspaper, TV and Internet

    daily/weekly/monthly/more seldom/never [set of responses]

19. How old are you?

20. Sex [m/w]

21. Are you born in Germany? [yes/no]

22. If you are not born in Germany, how long do you already live here?

23. In which federal state do you live?

24. What is the highest level of education you have completed?

    primary education/ lower secondary education/secondary education/higher secondary education (Fachhochschulreife)/higher secondary education (Allgemeine Hochschulreife) [set of responses]

25. Please tick the box, if correct: I am a trainee/student; I live in a flat-sharing community.

# 5 Unemployment and personality: Are conscientiousness and agreeableness related to employability?[1]

## 5.1 Introduction

There is a broad consensus that cognitive skills und labor market outcomes are closely connected (Heckman et al., 2006). Meanwhile, there is growing consensus that noncognitive skills are relevant, too. An increasing literature shows a relationship between noncognitive skills and different work related outcomes.[2].

Noncognitive skills have been shown to influence occupational choice (Barrick and Mount, 1991; Cobb-Clark and Tan, 2011; Wells et al., 2016), job performance and income (Barrick and Mount, 1991; Dohmen et al., 2009; Heineck and Anger, 2010; Mueller and Plug, 2006; Nyhus and Pons, 2005; Semykina and Linz, 2007), absence probability (Störmer and Fahr, 2013), the duration of unemployment spells (Caliendo et al., 2015; Cuesta and Budría, 2017; Egan et al., 2017; McGee, 2015; Uysal and Pohlmeier, 2011), and the probability of unemployment (Egan et al., 2017).

As it is often done in economics, the term 'noncognitive skills' is used synonymously to personality in this paper. Across disciplines, there are different ways to conceptualize a person's personality, but the most established model of personality is the 'Big Five' framework proposed by Costa and McCrae (1992). This framework is based on the finding that - for most purposes - five dimensions are enough to approximate an individual's personality. The five dimensions are extraversion, conscientiousness, agreeableness, openness to experience

[1] An earlier version of this chapter is available as Discussion Paper No. 621 of the Hannover Economic Papers series.

[2] See Almlund et al. (2011); Borghans et al. (2008); Thiel and Thomsen (2013) for a review of the literature.

and neuroticism. See Almlund et al. (2011, Table 3) for an overview of the Big Five.

Why should personality traits influence labor market outcomes? The intuition is that individuals always have to exert some costly effort to achieve a certain outcome level.

The effort necessary to achieve a certain outcome level depends on personality traits. Sometimes the costs (of needed effort) exceed the utility of the resulting outcome level for some personality profiles. These individuals need additional extrinsic motivation to exert enough effort to achieve a certain outcome level. Job related tasks, for example, sometimes require some cooperation. Being a cooperative teamplayer demands less effort from an individual who is more *agreeable* as from someone who scores lower in the dimension *agreeableness*.

But not just the effort necessary might be different. Also intrinsic motivation (utility of the resulting outcome) might differ. This is consistent with the finding that high scorers in conscientiousness gain greater satisfaction from work. Their life satisfaction also responds more sensitively to the experience of unemployment. This finding suggests that conscientious individuals might be more (intrinsically) motivated to be a good employee (Boyce and Wood, 2011; Boyce et al., 2010; Judge et al., 2002).

The literature on personality and labor market outcomes generally agrees that conscientiousness is the most important personality trait for predicting several labor market outcomes (Cuesta and Budría, 2017; Egan et al., 2017; Fletcher, 2013, amongst others). This is quite intuitive, because individuals scoring low in conscientiousness are unconcerned and careless, while high scorers in this dimension are effective and organized.

A positive correlation between agreeableness, conscientiousness, and labor market outcomes also has been shown by the literature on organizational citizenship behavior (for a review see Podsakoff et al., 2000). While low scorers in agreeableness are competitve and antagonistic, high scorer are cooperative, friendly and sympathetic. Agreeableness is positively related to organisational citizenship which sum up behavioral aspects and social cohesion. Organisational citizenship behavior is not easy to measure and to compensate for. Nevertheless, it is crucial for an organisation to function. Employers value conscientious employees for consistently high level of work motivation. Thus, employees who score high in the dimensions conscientiousness and agreeableness are of special value for employers (Podsakoff et al., 2000).

Empirical evidence suggests that labor markets give an advantage to individuals with high level of conscientiousness and agreeableness. Less conscious and agreeable individuals need to make more effort to find and keep a suitable employment. The question is, whether the welfare state lowers the extrinsic motivation for taking this effort. If this is true, the inhibi-

tion threshold of being unemployed for low scorers in conscientiousness and agreeableness is systematically lowered, and we should observe higher unemployment rates and unemployment durations.

Even if there is some literature which finds a significant correlation between the other Big Five dimensions and labor market outcomes like wages and occupational choice, we focus on the dimensions concientiousness and agreeableness, here. We do this, because studies investigating the association between Big Five personality traits and unemployment find significant associations between unemployment on the one side and conscientiousness and agreeableness on the other side only (Cuesta and Budría, 2017; Egan et al., 2017; Fletcher, 2013).

We assume that low levels of agreeableness are outweighed by a high level of conscientiousness or vice versa. Thus, individuals who score low in both dimensions are particularly disadvantaged at the labor market and have a higher risk of being permant or again and again unemployed. This is why we use a definition of personality which combines conscientiousness and agreeableness. This combined personality trait is called *AC-score* in the following. We will use the terms noncognitive skills, personality, and AC-score synonymously.

For investigating whether AC-scores and unemployment are correlated two types of unemployed are distinguished. First, individuals with long unemployment spells are of interest, and second, we are also interested in individuals who often switch between unemployment and employment. The risk of unemployment and educational attainment are negatively correlated, and educational achievements also depend on personality (Almlund et al., 2011; Cunha et al., 2010). Thus, the indirect influence of personality on welfare recipient status is well established. This paper will examine whether there is a direct effect of personality on welfare recipient status, too. This would mean that personality influences welfare recipient status beyond its effect through educational attainment. For measuring the direct effect an factor analytic approach is needed (see amongst others Almlund et al., 2011; Borghans et al., 2008; Heckman et al., 2006). Here, a latent structure model[3] is used to infer cognitive and noncognitive factor scores. We refer to this approach in more detail in section 5.3.2

The intuition that low scorers in concientiousness and agreeableness struggle at the labor market is not novel, but it is also a part of the Welfare Trait theory proposed by Perkins (2016). He underpins his argumentation with a number of evidence based on diverse methodologies. Brain injuries case studies show, that reductions in the levels of conscientiousness and agreeableness decrease employability (Blummer and Benson, 1975; Damasio, 1994). Perkins (2016) also presents longitudinal studies which show that personality measured in

[3] Also known as confirmatory factor analysis.

childhood predicts occupational outcomes in adulthood (Moffitt et al., 2011). Literature on troubled families shows that adults of the troubled families, on average, possess lower levels of conscientiousness and agreeableness than adults of control families. These differences in personality go hand in hand with significantly worse work records (Tonge et al., 1975, 1981). Perkins (2016) concludes that the methodological diverse evidence on the relationship between agreeableness and conscientiousness on the one side and employability at the other side suggests that they are indeed connected. But an exhaustive empirical exploration of this hypothesis does - to the best of our knowledge - not exist, yet.

The paper is organized as follows: Section 5.2 reviews the related literature. Section 5.3 presents the data and the factor analytic approach. Section 5.4 presents empirical strategies and results. Section 5.5 concludes.

## 5.2 Related literature

Egan et al. (2017) study the influence of pre-labor market measures of Big Five personality traits on the risk of unemployment. Their results show that conscientiousness - and no other Big Five personality trait - in adolescence indeed predict future unemployment. Even the inclusion of two additional education variables (academic motivation and educational assessment at age 26 and 30) to account for possible pathways between the adolescent level of conscientiousness and the future risk of unemployment does not change results qualitatively. Their results also suggest that low levels of conscientiouness matter more for job keeping than for job finding.

Cuesta and Budría (2017) show that conscientiousness is negatively correlated with the probability of unemployment. Contrary to the hypothesis in this paper they find a positive link between the risk of unemployment and agreeableness, but an intuitive explaination for this result is not given. Interestingly, they find no significant role of the remaining Big Five personality traits[4] in explaining unemployment transition. Cuesta and Budría (2017) also find a negative correlation of positive reciprocity and risk of unemployment. As Dohmen et al. (2008) show, agreeableness and conscientiousness are important determinants of positive reciprocity.

Fletcher (2013) investigates the association between employment status at age 30 and the Big Five personality traits. He estimates a sibling fixed effects model to control for individual heterogeneity based on family background. After inclusion of family fixed effects he finds

[4]Namely neuroticism, extraversion, and openness.

a positive association only between concientiousness and probability of being employed at age 30.

Evaluations of early childhood intervention programs find an indirect association between personality and unemployment. This interventions trained - amongst others - noncognitive skills related to agreeableness and conscientiousness. These improvements of noncognitive skills are longlasting and improve labor market outcomes. For an overview see Almlund et al. (2011) and Kautz et al. (2014). This kind of literature hints at a causal channel from personality to labor market outcomes. Nevertheless, it does not exclude that there is also a channel in the opposite direction. But Cobb-Clark and Schurer (2012) find little evidence that (economically meaningful) intra-individual personality change is related to adverse employment. Moreover, they show that Big Five personality traits seem to be relativly stable among working age adults.

All of this studies show, that the Big Five dimensions concientiousness and agreeableness are important determinants of unemployment probability and unemployment duration. Different empirical strategies were used to identify the relationship between personality traits and unemployment. But none of these studies use a factor analytic approach to identify an association between unemployment and personality beyond the channel of cognitive skills.

We complement existing literature by using a combined measure of both trais (the *AC-score*) and by measuring the direct association between personality and unemployment - this means the association beyond the channel of educational attainment - by using the concept of factors. Economists adopt this approach from the psychological literature (Almlund et al., 2011; Borghans et al., 2008; Cattan, 2010; Heckman et al., 2010, 2006). The latent factor structure model used in this paper is described in Section 5.3.2. But first the data set and sample are introduced in Section 5.3.1.

## 5.3 Data and measurement of cognitive and noncognitve skills

### 5.3.1 Data and sample

To test whether or not there is an association between personality and unemployment several variables are necessary. First, the *AC-score* has to be determinend. Hence, measures for the Big Five dimensions concientiousness and agreeableness are needed. Moreover, we differentiate several aspects of unemployment: unemployment risk, the duration of unem-

ployment, and status changes between employment and unemployment. This measures and socio-economic control variables are presented in the following.

Data is used from the German SOEP Panel[5] (G-SOEP, v.30). Questions on Big Five Items (BFI-S) were asked in waves 2005, 2009 and 2013. For each dimension there are three questions and the questions for the dimensions conscientiousness and agreeableness read as follows:

> 'I see myself as someone who: ($c_1$) is a thorough worker, ($c_2$) tends to be lazy, ($c_3$) carry out tasks efficiently, ($a_1$) is sometimes too coarse with others, ($a_2$) is able to forgive, and ($a_3$) is friendly with others.'

Here, ($c_1$) to ($c_3$) refer to the dimension conscientiousness, and ($a_1$) to ($a_3$) refer to agreeableness. The questions consist of positive and negative statements refering to the Big Five dimensions. Variables were constructed so that values (still) range from 1 to 7 but that higher values always indicate higher level of agreeableness or conscientiousness, repectively. Mean answers on these questions are about five. More detailed summary statistics can be found in Table 5.A1 in the Appendix.

The sample is not only restricted to years 2005, 2009, and 2013 but also to respondents aged between 18 and 65 years, because we are only interested in the population in working age. Students and trainees are dropped, too. Moreover, we exclude individuals with officially recognized reduction in earning capacity or severe disability. Thus, the sample consists of individuals who are generally capable to work only. All in all, for regressions a balanced panel is used which consists of 5163 individuals.

For cognitive skills three indicator variables were considered: school education (*educ_s*), vocational education (*educ_w*), and the variable *status*, which differentiates between non-working, blue-collar worker, white-collar worker, freelancer, and public servants. More detailed information and summary statistics can be found in Table 5.A1 in the Appendix.

Several dependent variables were used to identify individuals who struggle with the labor market.

First, the length of unemployment spell is used as a dependent variable. Respondents were asked in each wave about their time spent unemployed in their lives up to this point. Of course, the spell of unemployment is highly autocorrelated and cannot decrease over time. Therefore, we use the difference between the spells of unemployment in 2013 and in 2009 as

[5]The G-SOEP is a representative longitudinal study that contains a large set of socio-economic, attitudinal, and labor market characteristics of respondents.

the dependent variable ($\Delta unemployment_{(13-09)}$). This is just a second best measure of unemployment duration, but if personality and unemployment duration are generally associated, they should also be an association in each arbitrary time intervall. To decrease autocorrelation the lagged dependent variable is included, too. For this, the difference between the spells of unemployment in 2009 and in 2005 is used. This lowers autocorrelation remarkably. A more detailed discussion can be found in Section 5.4.1.

Second, the probability of receiving welfare benefits[6] is used as a dependent variable. In style of the German social assistance system the variable is labeled as *ALGII* (see footnote 6 for an explanation).

Third, on-and-off welfare recipient status is used as dependent variable. The G-SOEP reports - for each year - whether respondents are employed or unemployed. We construct a variable which counts the number of status changes between 1984 and 2013. To achieve inter-individual comparability we divided an individual's total number of status changes by her number of years included in the G-SOEP. Because of the yearly base the number of status changes is underestimated.

Mean unemployment duration between 2009 and 2013 is two month. About 4 percent of the sample receive unemployment benefits in 2013, and the mean (standardized) number of status change is 0.05. More detailed information can be seen in Table 5.A1 in the Appendix.

Table 5.A1 also shows summary statistics of our socio-economic control variables. The average age in the sample are 49.4 years and 45.3 percent of the sample is male. 94.7 percent of the sample are German citizens.

### 5.3.2 Cognitive and noncognitive skills

It is not clear whether higher noncognitive ability causes lower probability of welfare dependece or whether higher cognitive skills cause both higher noncognitive skills and lower probability of welfare dependence. It might also be possible that higher noncognitive skills favor higher cognitive skills, which lower probability of welfare dependence. The construction of factors enables us to cut the association between cognitive and noncognitive skills.

Both, cognitive and noncognitive skills are hypothetical constructs which cannot be asked

[6] In Germany, there is a system of social assistance for the case of unemployment. Individuals subject to social insurance contribution for at least 12 month within the last two years receive (contribution-dependent) *Arbeitslosengeld I*. *Arbeitslosengeld I* is payed for maximally 12 months, if available for the labor market. An individual who is not or not anymore entitled to *Arbeitslosengeld I* receives *Arbeitslosengeld II*. Strictly speaking, the second dependent variable is an indicator variable for receiving *Arbeitslosengeld II*.

for directly. Therefore, measurement models were used to define relationships between observed phenomena (called indicators, items, or manifest variables) and unobservabel concepts (called factors or latent variables). The latent factor structure model (also called confirmatory factor analysis) is a common tool to test measurement models for hypothetical constructs. In contrast to explanatory factor analysis, latent factor structure models allow inference about the estimated latent factors (Thiel and Thomsen, 2013). See Brown (2014) for an introduction into latent factor structure mode. Explanations in this paper are based on Backhaus et al. (2015).

In this paper, noncognitive skills are presented by the *AC-score*. Individuals scoring low in both concientiousness and agreeableness are assumed to struggle at the labor market and have a higher risk of being unemployed. Thus, the indicators for the hypothetical construct *AC-score* are the indicator variables intended to map the Big Five dimension conscientiousness and agreeableness. For agreeableness these are variables $a_1$ to $a_3$ introduced in Section 5.3.1. For conscientiousness these are variable $c_1$ to $c_3$ introduced in Section 5.3.1, too.

Indicators of cognitive skills are school education, voacational education and the status of the current job (the distinction between non-working, blue-collar worker, white-collar worker, freelancer, and public servants).

The measurement model is assumend to be reflective. Thus, we assume a high correlation between indicator variables which is caused by the corresponding latent variable (=factor). That means that the *AC-score* is the driving force of the correlation between all indicator variables $a_1$ to $c_3$. Accordingly, the factor *cognitive* drives the correlation between the indicator variables school education, voacational education and the status of the current job.

The factor analysis now uses the correlations of indicator variables to estimates individual values (called factor scores) for the factors *AC-score* and *cognitive*. To disentangle the effects of cognitive and noncognitive skills it is common to assume both factors to be orthogonal (Heckman et al., 2006; Thiel and Thomsen, 2013).

Here, the measurement model for individual $k$ is described by the following equations:

$$educ\_w_k = \lambda_{11} \cdot cognitive_k + \varepsilon_{1k} \tag{5.1}$$
$$educ\_s_k = \lambda_{21} \cdot cognitive_k + \varepsilon_{2k} \tag{5.2}$$
$$status_k = \lambda_{31} \cdot cognitive_k + \varepsilon_{3k} \tag{5.3}$$

$$a\_1_k = \lambda_{42} \cdot \text{AC-s}core_k + \varepsilon_{4k} \tag{5.4}$$
$$a\_2_k = \lambda_{52} \cdot \text{AC-s}core_k + \varepsilon_{5k} \tag{5.5}$$
$$a\_3_k = \lambda_{62} \cdot \text{AC-s}core_k + \varepsilon_{6k} \tag{5.6}$$
$$c\_1_k = \lambda_{72} \cdot \text{AC-s}core_k + \varepsilon_{7k} \tag{5.7}$$
$$c\_2_k = \lambda_{82} \cdot \text{AC-s}core_k + \varepsilon_{8k} \tag{5.8}$$
$$c\_3_k = \lambda_{92} \cdot \text{AC-s}core_k + \varepsilon_{9k} \tag{5.9}$$

where $\lambda_{ij}$ ($i = 1,...,9$; $j = 1,2$) measures the correlation between the $i$-th indicator variable and factor $j$. This correlation is called factor loading.

The confirmatory factor analysis estimates coefficients of the theoretical variance-covariance matrix of the measurement model. Because standardized values of all variables are used (mean=0, sd=1) the variance-covariance matrix is equal to the correlation matrix.

It is assumed that factors, factors and disturbance terms $\varepsilon_{ik}$, and disturbance terms $\varepsilon_{ik}$ are uncorrelated. The assumption of uncorrelated factors is what cuts the association between cognitive and noncognitive skills, here. A theoretical derivation of the correlation matrix can be found in the Appendix.

In practice, measurement models are overidentified and an iterative algorithm is used to minimize the discrepancy function of empirical and theoretical correlation matrix. In this paper the Maximum-Likelihood-Method (ML) is used[7].

Correlation matrix estimation yields results for factor loadings $\lambda_{ij}$ and disturbance terms $\varepsilon_{ik}$. Indicator variable values are given in the data set. Thus, rearranging equations (5.1) to (5.9) allow to estimate of individual factor scores $AC\text{-}score_k$ and $cognitive_k$. These individual factor score estimates[8] are used in Section 5.4 as noncognitive and cognitive skill measure.

[7] Results are not driven by Maximum-Likelihood assumptions. Asymptotic distribution free estimation (ADF) shows qualitatively similar results. ADF provides justifiable point estimates and standard errors under nonnormality of latent factors and/or indicator variables. But, if latent factors can be assumed to be normally distributed, ML is more efficient.

[8] STATA use a calculation analogue to regression scoring. As seen in Table 5.A1, few observations of item variables are missing in the sample. In this cases, STATA conditions on items with observed values only.

Factor loadings and fit statistics for 2005, 2009 und 2013 can be seen in Table 5.A2 in the Appendix. This estimation is not restricted to our main sample, but includes all available observations to increase model fit. The sample is restricted afterwards. All factor loadings are statistically significant on the 1% level. Estimated coefficients show that the factor *AC-score* is - as assumed - positively correlated with all indicator variables. Thus, higher level in conscientiousness and agreeableness indicate higher values of *AC-score*. Size of factor loadings are all in all acceptable and indicate, that a higher share of variation in the dimension of conscientiousness is explained by the factor *AC-score* than of agreeableness[9].

The global fit statistics suggest that the model specification is good. The *Standardized Root Mean Square Residual (SRMR)* is a goodness-of-fit index which is independent from sample size and robust against voilation of the assumption of multinomial distribution. A value of *SRMR* less or equal than 0.08 indicates good model fit (Hu and Bentler, 1999). As can be seen in Table 5.A2 in the Appendix values of *SRMR* range from 0.051 in 2005 and 2013 and 0.052 in 2009. The *Root-Mean-Square-Error of Approxiamtion (RMSEA)* is a statistical-inferences-index which is constructed to avoid common problems of the Chi-Squared-Test. Values of $RMSEA \geq 0.08$ and $RMSEA < 0.1$ indicates an acceptable model fit. Table 5.A2 in the Appendix show that values range from 0.082 in 2013 and 0.087 in 2005. But in all specifications $pclose = 0.000$ apllies. This suggests that $H_0 : RMSEA \leq 0.05$ should not be rejected, which implies a good model fit (Browne et al., 1993).

Results of individual factor score estimations for *AC-score* are presented as box plots in Figure 5.1. Factor scores are estimated as deviations from the mean (of factor scores). Thus, they are a relative representation and it is not recommendable to interpret them quantitatively. What we can say is, that highly positive factor scores imply strinking above average combined value of agreeableness and conscientiousness, and that highly negative factor scores imply strinking below average combined value of agreeableness and conscientiousness.

Median factor scores are about 0.02 for all three years. Remember that values of personality indicator variables were standardized. As shown in Table 5.A1, the mean value of the sample is close to zero (about 0.002). The upper and the lower hinge (75th percentile and 25th percentile) range from about 0.25 to $-0.20$. A bit more variation is in upper and lower adjacent values which draw the border between inside and outside values. But in all three years there are just outside values at the lower end of the personality factor score distribution. This means, that there are no respondents with extraordinary high level of agreeableness and

[9] To evaluate whether concientiousness or agreeableness is the driving factor, we would prefer a regression including three factors - *cognitive skill*, *conscientiousness*, and *agreeableness* - into one regression. But, it is techniqually not feasible to estimate three orthogonal factors and get an acceptable model fit. Thus, this weakness has to be accepted.

conscientiousness but some respondents with extraordinary low level.

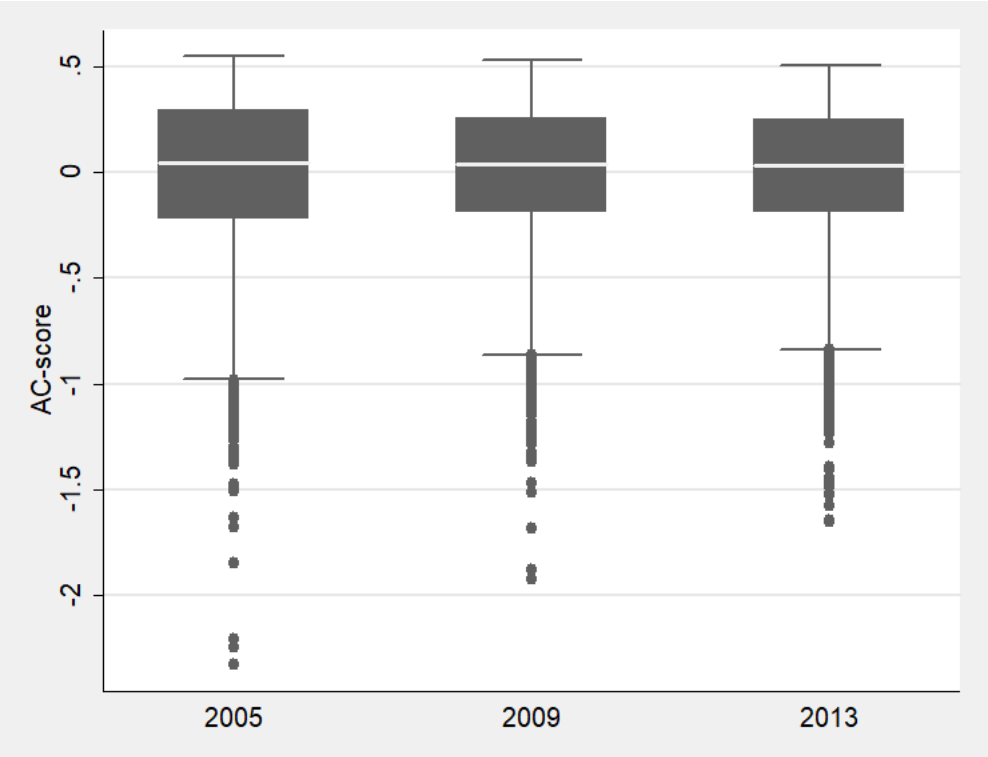



Figure 5.1: Boxplots for *AC-score*.

There are no statistically significant mean-level change in factor scores of personality between 2005, 2009, and 2013. This conforms with Cobb-Clark and Schurer (2012), who show that Big Five personality traits are stable for working age adults.

## 5.4 Results

### 5.4.1 Personality and unemployment spells

Figure 5.2 shows box plots of years spent in unemployment over the life cycle. The median values are zero for all three years. The 75th percentiles are about 1. This means, that 75 percent of respondents were unemployed for about one year or less up to the responding time period. Upper adjacent values are about 3 years. Outside values range from this lines up to 23 in 2005, 28.3 in 2009, and 29.3 in 2013. This means, that there are some respondents with extraordinarily high spells of unemployment over the life cycle.

The question is, whether or not these extraordinarily high spells of unemployment are related to the striking low levels of agreeableness and conscientiousness outlier show in Figure 5.1.

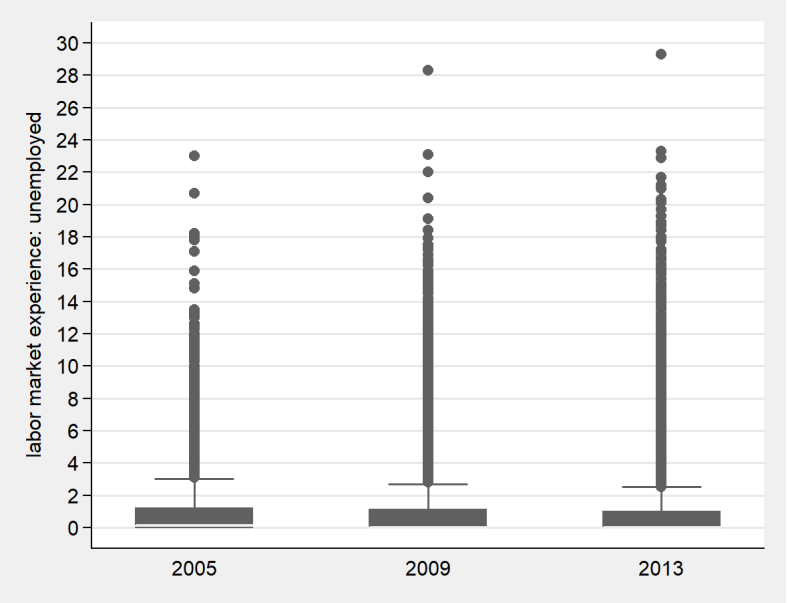



Figure 5.2: Boxplots for labor market experience unemployed.

This would suggest that are relationship between unemployment and personality exists.

As explained in Section 5.3.1, using total spell of unemployment as dependent variable for answering this question is inappropriate, because it is highly autocorrelated. If we regress spell of unemployment in 2013 on spell of unemployment in 2009 we get a coefficient of determination of $R^2 = 0.96$. In such a specification it is difficult to estimate the relationship to determinants other than the lagged dependent variable.

This is why we use the first difference of spell of unemployment as dependent and lagged dependent variable. For personality we use the *AC-scores* from 2009, because this should be the basis for behavior between 2009 and 2013.

Figure 5.3 gives an idea of how our dependent variable looks like. Respondents were grouped into five categories. Category 0 includes all who were not unemployed between 2009 and 2013. Category 1 includes respondents who were unemployed for one year or less in this time span. Category 2 covers respondents who were unemployed for more than one year, but not longer than two years. Category 3 covers respondents who were unemployed for more than two years, but not longer than three years. And category 4 covers respondents who were unemployed for more than three years, but not longer than four years. About 85 percent of our sample were not unemployed between 2009 and 2013, about 7 percent belong to category 1, about 3 percent belong to category 2, about 1.5 percent belong to category 3, and about 3 percent were unemployed for more than 3 years but not longer than 4 years.

To test whether there is an associaiton between unemployment duration and personality sim-

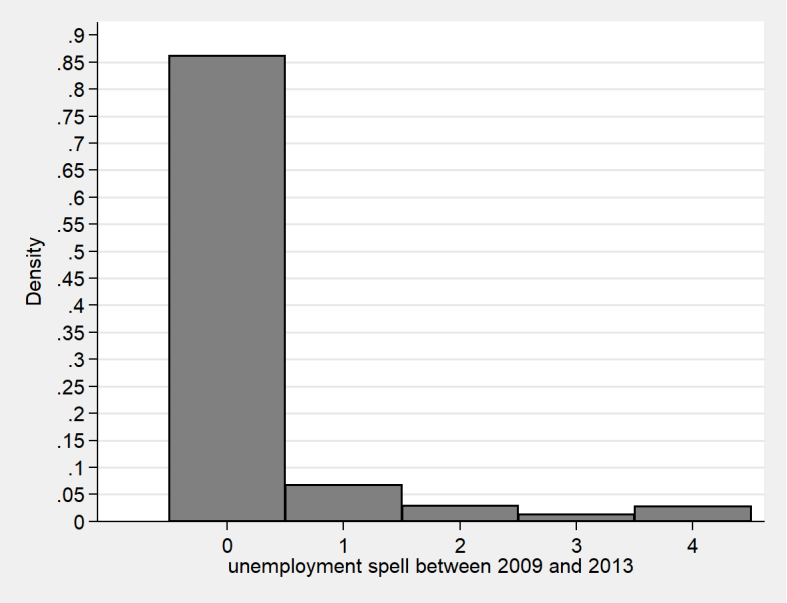



Figure 5.3: Unemployment between 2009 and 2013. Upper limit of years in unemployment on the x-axis.

ple OLS regression were run on the following equation:

$$\Delta unemployment_{k,(13-09)} = \beta_0 + \beta_1 \cdot \Delta unemployment_{k,(09-05)} + \beta_2 \cdot \text{AC-s}core_{k,09} \quad (5.10)$$
$$+ \beta_3 \cdot cognitive_{k,09} + \beta_4 \cdot X_{k,09} + \mu_{k,(13-09)} \quad (5.11)$$

Control variables $X_{k,t}$ are *sex*, *age*, $age^2$, $family\ status$, *german*, and *state*. For region of residence (*state*) is controlled for to capture institutional differences - like different unemployment rates - in German states. To capture different entitlements for benefits it is controlled for $family\ status$ and german citizenship (*german*).

It is also standard to control for socio-economic status of parents and income. I refrain from doing that here. First, parents socio-economic status is one of the main driving factors of an individual's cognitive and noncognitive skills (Perkins, 2016). Second, income is highly correlated with the factor *cognitive*.

Table 5.1 presents results for the full sample. In column (1) *AC-score* has the assumed negative relationship to the change of time spend unemployed, which is highly statistically significant. Higher values of *AC-score* indicate higher level of agreeableness and conscientiousness. Respondents with low level of agreeableness and conscientiousness spend - on average - more time in unemployment.

Unemployment duration between 2009 and 2013 is - as expected - also negatively correlated with the factor *cognitive*.

Because of the use of factors we refrain from intepreting effect sizes quantitatively. But the pattern of coefficient sizes suggests that the association between unemployment duration and personality is relevant.

Men have on average higher unemployment durations than women. Unemployment duration firstly decreases in age but this effect diminishes over time. Married individuals living with their spouse have lower unemployment durations than divorced, unmarried or single individuals. German citizenship is not statistically significantly associated with unemployment duration. The region of residence seems not to be that important.

To explore potential heterogeneity of effects columns (2) and (3) split the sample into women and men. There are no indications for heterogenous effects. All in all, results do not change qualitatively, just the coefficient of state of residence lose statistical significance.

Because of the high share of individuals who never have been unemployed, the analysis is also restricted to individuals who experienced unemployed, yet. Table 5.A3 in the Appendix reports results for these respondents. Again, specifications in columns (2) and (3) split the sample into women and men.

Here, results suggest that *AC-score* is more important for women than for men. The coefficient is not only somewhat higher, the association between unemployment duration and personality is merely statistically significant in the female subsample[10].

### 5.4.2 Personality and unemployment benefits

Now, it should be investigated whether individuals scoring low in concientiousness and agreeableness have a higher probability of being welfare recipients.

In 2013, about 4 percent of the sample received unemployment benefits[11]. Figure 5.4 shows box plots of *AC-score* by subgroups 'no welfare recipient in 2013' and 'welfare recipient in 2013'. Mean values of *AC-score* vary from 0.004 for 'no welfare recipients in 2013' to $-0.043$ for 'welfare recipients in 2013'. This and the comparison of box plots suggest,

[10] In a subgroup analysis Fletcher (2013) also just find statistically significant effects of C and A in the female subsample. In contrast, Egan et al. (2017) and Cuesta and Budría (2017) find no differences between men and women.

[11] Strictly speaking, the term unemployment benefits means *Arbeitslosengeld II* (also called Hartz IV). See footnote 6 for an explanation of the German system of social assistance

Table 5.1: Personality and spell of unemployment between 2009 and 2013

| | (1) full | | (2) female | | (3) male | |
|---|---|---|---|---|---|---|
| | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| $\Delta unemployment_{(09-05)}$ | 0.637*** | (0.009) | 0.585*** | (0.011) | 0.714*** | (0.013) |
| $AC\text{-}score_{09}$ | -0.058*** | (0.020) | -0.062** | (0.027) | -0.055* | (0.028) |
| $cognitive_{09}$ | -0.060*** | (0.013) | -0.064*** | (0.018) | -0.054*** | (0.018) |
| *men* | 0.040*** | (0.013) | | | | |
| *age* | -0.018*** | (0.007) | -0.013 | (0.009) | -0.019* | (0.010) |
| $age^2$ | 0.000*** | (0.000) | 0.000 | (0.000) | 0.000** | (0.000) |
| *family status* | 0.025*** | (0.006) | 0.022*** | (0.007) | 0.036*** | (0.009) |
| *german* | 0.007 | (0.030) | -0.005 | (0.040) | 0.030 | (0.046) |
| *state* | 0.003** | (0.001) | 0.003 | (0.002) | 0.003 | (0.002) |
| *constant* | 0.354** | (0.161) | 0.344 | (0.218) | 0.260 | (0.237) |
| N | 5,163 | | 2,825 | | 2,338 | |
| $R^2$ | 0.549 | | 0.524 | | 0.592 | |

Robust standard errors in parentheses. ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$
*Dependent variable:* Spell of unemployment between 2009 and 2013.

that the distribution of individual factor scores of *AC-score* are more skewed to the right for individuals who receive unemployment benefits than for individuals which do not receive unemployment benefits in 2013. The dependent variable $ALGII_{k,t}$ is equal to one if individual $k$ receives unemployment benefits in period $t$, and zero otherwise.

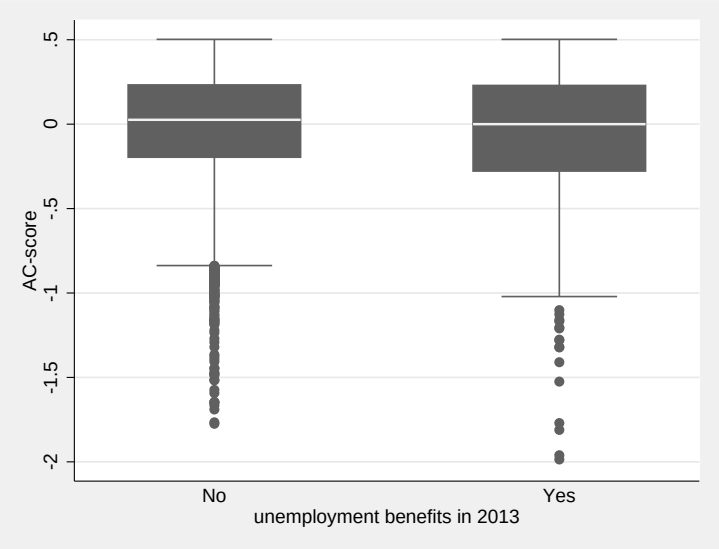



Figure 5.4: Boxplots of *AC-scores* for individuals who do and do not receive unemployment benefits in 2013.

To test whether there is a statistically significant association between the probability of receiving unemployment benefits and *AC-score*, probit regressions were run on following equation:

$$ALGII_{k,13} = \beta_0 + \beta_1 \cdot ALGII_{k,05} + \beta_2 \cdot \text{AC-s}core_{k,09} + \beta_3 \cdot cognitive_{k,09} + \beta_4 \cdot X_{k,13} + \mu_{k,13}$$

As with unemployment duration, the probability of being a welfare benefit recipient is also path dependent. Therefore, its lag is included into regression. Control variables $X_{k,2013}$ are the same as in the previous section. Welfare recipient status today is caused by behavioral patterns showed in the (recent) past. Intuitively, it is more convincing, that this behavioral patterns are grounded on personality traits exhibited in the (recent) past. Therefore, we include lagged individual factor scores into regressions[12].

Table 5.2 shows marginal effects. As in the previous section, column (1) refers to the overall sample and columns (2) and (3) split the sample into female and male. Results for the overall sample show a highly statistically significant negative association between the probability of receiving welfare benefits and personality. This means, that individuals with higher level in conscientiousness and agreeableness have a lower risk of welfare recipient status. Cognitive skills are also negatively correlated with the probability of welfare recipient status. Signs of socio-economic controls are similar to results shown in Section 5.4.1.

Table 5.2: Personality and probability of receiving unemployment benefits in 2013

| | (1) full | | (2) female | | (3) male | |
|---|---|---|---|---|---|---|
| | Mfx. | Std. Err. | Mfx. | Std. Err. | Mfx. | Std. Err. |
| $ALGII_{05}$ | 0.236*** | (0.032) | 0.201*** | (0.038) | 0.293*** | (0.055) |
| $AC\text{-}score_{09}$ | -0.011*** | (0.004) | -0.013** | (0.005) | -0.008 | (0.006) |
| $cognitive_{09}$ | -0.028*** | (0.004) | -0.032*** | (0.005) | -0.023*** | (0.005) |
| *men* | -0.000 | (0.003) | | | | |
| *age* | -0.003** | (0.001) | -0.00** | (0.002) | -0.002 | (0.002) |
| $age^2$ | 0.000** | (0.000) | 0.000* | (0.000) | 0.000 | (0.000) |
| *family status* | 0.008*** | (0.001) | 0.008*** | (0.002) | 0.007*** | (0.002) |
| *german* | -0.002 | (0.006) | -0.002 | (0.007) | -0.001 | (0.01) |
| *state* | 0.001*** | (0.000) | 0.001*** | (0.000) | 0.001*** | (0.000) |
| N | 5,163 | | 2,825 | | 2,338 | |
| *Pseudo* $R^2$ | 0.325 | | 0.327 | | 0.342 | |

Robust standard errors in parentheses. ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$
*Dependent variable:* Indicator variable for receiving unemployment benefits in 2013.

Again, results refering to *AC-score* seem to be driven by the female subsample, as can be seen in columns (2) and (3) of Table 5.2.

[12]It is also standard in the personality literature to use personality traits measured prior to the predicted outcomes to adress the potential reverse causality problem Heckman et al. (2006).

### 5.4.3 Personality and on-and-off welfare recipients

The probability and duration of unemployment might not be the only outcomes influenced by low levels of conscientiousness and agreeableness. Results of Egan et al. (2017) suggest that a low level of conscientiousness matters for job keeping. Perkins (2016) offer (rather anecdotical) evidence that individuals with a low level of both concientiousness and agreeableness have difficulties to keep their job. In this section we evaluate whether there is an association between *AC-score* and the number of status changes between employment and unemployment.

The G-SOEP asks respondents about their employment status[13] on a yearly base. We construct a variable which counts all status changes between 1984 and 2013. To achieve inter-individual comparability we divided an individual's total number of status changes by the number of years she is included in the G-SOEP. If there is a missing value for employment status the year is skipped (it is also not accounted in the total number of observations for the specific respondent). For simplicity, this normalized variable is called *number of status changes* in the following. Because of the yearly base the number of status changes is underestimated.

About 70 percent of the sample experienced no status change between 1984 and 2013. In 2013, the mean of the whole sample is 0.050 status changes with a standard deviation of 0.097. The distribution of status changes experienced by respondents with values of status changes greater than zero can be seen in Figure 5.5.

With a mean of 0.167, a median of 0.143, and a maximum value of 0.750 this distribution is skewed to the right. Most individuals exhibit relatively low numbers of status changes, while there are some individuals with strinkingly large values.

To find out whether there is an association between the extraordinarily high values in status changes and extraordinarily low individual factor scores of *AC-score* (see Figure 5.1) OLS regressions were run on following equation:

$$\begin{aligned} \textit{Num. of status changes}_{k,13} = \beta_0 + \beta_1 \cdot \textit{Num. of status changes}_{k,05} + \beta_2 \cdot \text{AC-score}_{k,09} \\ + \beta_3 \cdot \textit{cognitive}_{k,09} + \beta_4 \cdot X_{k,13} + \mu_{k,13} \end{aligned}$$

[13] It is asked whether an individual is employed or unemployed. There is no differentiation between Arbeitslosengeld I and II.

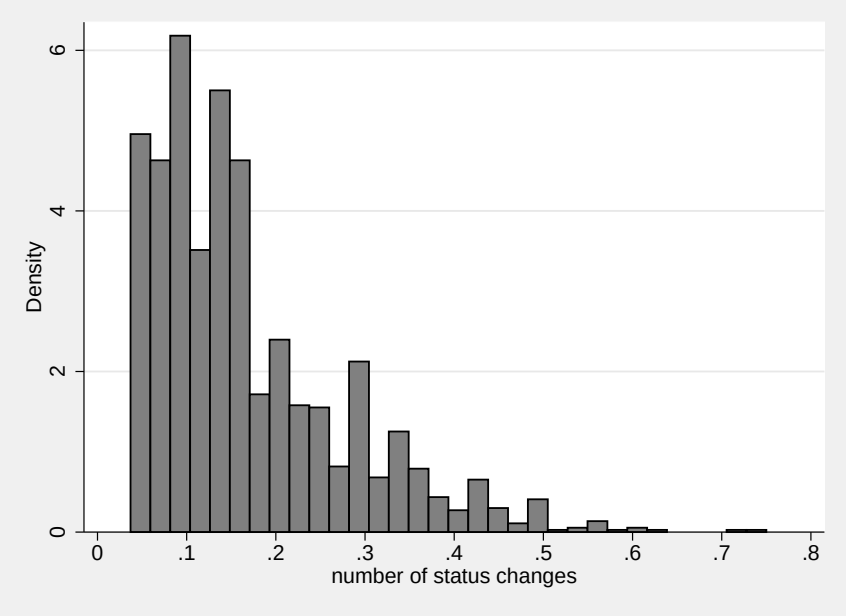



Figure 5.5: Distribution of status changes experienced by respondents with more than zero status changes (in 2013).

As the dependent variable *number of status changes* is autocorrelated by construction its lag has to be included into regression. Control variables $X_{k,13}$ and individual factor scores *AC-score* and *cognitive* are the same as in the previous subsection.

Table 5.3 presents results. Again, column (1) refers to the whole sample and columns (2) and (3) refer to women and men, respectively. As can be seen in column (1) signs and significance of socio-economic control variables are as before. There is also a statistically significant, negative correlation between *AC-score* and *number of status changes*. Cognitive skills and *number of status changes* are statistically significantly correlated, too, and the coefficient has the expected negative sign. Up to this point no surprises: individuals with higher noncognitive and cognitive skills - on average - exhibit lower numbers of status changes, thus, have lower probabilties to be on and off welfare recipients.

But there is a surprise in columns (2) and (3). This time, the negative correlation between *AC-score* and the dependent variable is statistically significant for men only.

Results suggests that personality is an important determinant of women's risk of unemployment and unemployment duration, but for men personality is more a matter of job keeping.

Table 5.3: Personality and on-and-off welfare recipients

| | (1) full | | (2) female | | (3) male | |
|---|---|---|---|---|---|---|
| | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| *Num. of status changes*$_{05}$ | 1.272*** | (0.015) | 1.267*** | (0.020) | 1.279*** | (0.022) |
| *AC-score*$_{09}$ | -0.006** | (0.003) | -0.004 | (0.004) | -0.009** | (0.004) |
| *cognitive*$_{09}$ | -0.012*** | (0.002) | -0.011*** | (0.002) | -0.014*** | (0.002) |
| *men* | -0.001 | (0.002) | | | | |
| *age* | -0.011*** | (0.001) | -0.011*** | (0.001) | -0.011*** | (0.001) |
| $age^2$ | 0.000*** | (0.000) | 0.000*** | (0.000) | 0.000*** | (0.000) |
| *family status* | 0.004*** | (0.001) | 0.005*** | (0.001) | 0.004*** | (0.001) |
| *german* | 0.001 | (0.004) | 0.005 | (0.005) | -0.006 | (0.006) |
| *state* | 0.000** | (0.000) | 0.000 | (0.000) | 0.001*** | (0.000) |
| *constant* | 0.283*** | (0.020) | 0.274*** | (0.029) | 0.289*** | (0.029) |
| N | 5,163 | | 2,825 | | 2,338 | |
| $R^2$ | 0.618 | | 0.607 | | 0.634 | |

Robust standard errors in parentheses. ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$
*Dependent variable:* Sum of unemployment status changes in 2013 (change is measured on a yearly base).

## 5.5 Conclusions

Our results suggest that personality and unemployment are associated. Individuals with low levels of concientiousness and agreeableness have a higher risk of being welfare recipients, have longer unemployment durations, and change more frequently between employment and unemployment as more conscientious and agreeable individuals.

The association between receiving unemployment benefits and *AC-score* seems to be more important for women. In contrast, the association between *AC-score* and on-and-off welfare recipient status seems to be more important for men.

It would also be interesting to investigate the association between *AC-score* and attitudinal variables towards the welfare state. This would disentangle two possible pathways. First, it might be possible that low *AC-score* individuals have to exert more effort to find and keep a job. But secondly, it might also be possible that low *AC-score* individuals have a lower intrinsic motivation to find and keep a job because they think it is not necessary to live on their own expense. Unfortunately, the G-SOEP does not contain attended questions for such an analysis.

That we find a statistically significant correlation between personality and unemployment contributes to an socially controversial debate. The idea that welfare recipients differ in personality deepens ideological divides and leads to stigmatization of welfare recipients. Thus, we think it is important to remember that we just found an correlation. We cannot say

anything about reasons and consequences.

Our results adds findings that low scorers in agreeableness and conscientiousness have a higher risk of being welfare recipients. Perkins (2016) even goes one step further. He claims in his 'Welfare Trait Theory' that the low *AC-score* parents raise low *AC-score* children and that this - in combination with head-dependent welfare benefits - might initiate a hazardous welfare state dynamic similar to that proposed by Lindbeck et al. (1999). That requires a transmission of the *AC-score* from parents to their children and a replicator dynamic change initiated by the rise of the welfare state. That would lead to an increasing proportion of welfare recipients in the long run.

The literature shows that personality traits indeed evolve in early childhood and are relatively constant over the life cycle (Cobb-Clark and Schurer, 2012; Roberts, 2009). Thus, noncognitive skills are formed by childhood home and environment, where parents play an important role (Heckman et al., 2006). But - the good news is - empirical literature and evaluations of early cildhood intervention programs (like the Perry Preschool Program and the STAR Project) also show that it is possible to suppport children to develop reasonable levels of conscientiuoness and agreeableness

Results of this paper suggest that an association between unemployment and personality exists. Everything else is subject to future research.

## 5.6 Appendix

Table 5.A1: Descriptive statistics for 2013

| | Mean | Std. Dev. | Min | Max | N |
|---|---|---|---|---|---|
| *a_1: Am sometimes too coarse with others* | 4.882 | (1.618) | 1† | 7‡ | 5,140 |
| *a_2: Able to forgive* | 5.375 | (1.318) | 1‡ | 7† | 5,146 |
| *a_3: Friendly with others* | 5.781 | (1.058) | 1‡ | 7† | 5,140 |
| *c_1: Thorough worker* | 6.235 | (0.933) | 1‡ | 7† | 5,151 |
| *c_2: Tend to be lazy* | 5.635 | (1.517) | 1† | 7‡ | 5,136 |
| *c_3: Carry out tasks efficiently* | 5.863 | (1.033) | 1‡ | 7† | 5,140 |
| *educ_s*[1] | 4.191 | (1.240) | 1 | 6 | 5,104 |
| *educ_w*[2] | 2.304 | (0.825) | 1 | 4 | 5,163 |
| *status*[3] | 2.688 | (1.061) | 1 | 5 | 5,101 |
| *AC-score (factor score)* | 0.002 | (0.326) | -1.650 | 0.502 | 5,163 |
| *cognitive (factor score)* | 0.002 | (0.540) | -1.323 | 1.175 | 5,163 |
| *unemployment spell* | 1.217 | (2.808) | 0 | 29.3 | 5,163 |
| $\Delta unemployment_{(13-09)}$ | 0.212 | (0.703) | 0 | 3.9 | 5,163 |
| *ALGII* | 0.041 | (0.198) | 0 | 1 | 5,163 |
| *Num. of status changes* | 0.050 | (0.097) | 0 | 0.750 | 5,163 |
| *men* | 0.453 | (0.498) | 0 | 1 | 5,163 |
| *age* | 49.4 | (9.3) | 25 | 65 | 5,163 |
| *family status* | 1.710 | (1.200) | 1 | 7 | 5,163 |
| *german* | 0.947 | (0.225) | 0 | 1 | 5,163 |

*Source:* G-SOEP.

† agree strongly

‡ disagree strongly

[1] (6) higher secondary education (Abitur), (5) higher secondary education (Fachhochschulreife), (4) secondary education, (3) lower secondary education, (2) other , (1) primary education.

[2] (1) no professional training, (2) professional training, (3) applied science university diploma, (4) University degree/PhD

[3] (1) non-working , (2) blue-collar worker, (3) white-collar worker, (4) self-employed, (5) public servants

Table 5.A2: Estimated coefficients of the cognitive and noncognitive factors

| | 2005 | | 2009 | | 2013 | |
|---|---|---|---|---|---|---|
| | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| *educ_w* | | | | | | |
| cognitive | 0.772*** | 0.009 | 0.763*** | 0.009 | 0.754*** | 0.1 |
| constant | 2.664*** | 0.02 | 2.674*** | 0.02 | 2.681*** | 0.021 |
| *educ_s* | | | | | | |
| cognitive | 0.742*** | 0.009 | 0.749*** | 0.009 | 0.779*** | 0.01 |
| constant | 3.158*** | 0.023 | 3.223*** | 0.023 | 3.220*** | 0.024 |
| *status* | | | | | | |
| cognitive | 0.479*** | 0.009 | 0.482*** | 0.009 | 0.449*** | 0.01 |
| constant | 2.377*** | 0.019 | 2.481*** | 0.019 | 2.509*** | 0.02 |
| *c_1* | | | | | | |
| AC-score | 0.659*** | 0.009 | 0.650*** | 0.009 | 0.659*** | 0.009 |
| constant | 6.961*** | 0.048 | 6.515*** | 0.045 | 6.642*** | 0.047 |
| *c_2* | | | | | | |
| AC-score | 0.493*** | 0.01 | 0.433*** | 0.01 | 0.414*** | 0.011 |
| constant | 4.028*** | 0.029 | 3.625*** | 0.026 | 3.555*** | 0.027 |
| *c_3* | | | | | | |
| AC-score | 0.648*** | 0.009 | 0.661*** | 0.009 | 0.677*** | 0.009 |
| constant | 5.714*** | 0.04 | 5.430*** | 0.037 | 5.775*** | 0.041 |
| *a_1* | | | | | | |
| AC-score | 0.268*** | 0.012 | 0.253*** | 0.012 | 0.236*** | 0.012 |
| constant | 3.062*** | 0.023 | 2.989*** | 0.022 | 2.976*** | 0.023 |
| *a_2* | | | | | | |
| AC-score | 0.328*** | 0.011 | 0.291*** | 0.011 | 0.272*** | 0.012 |
| constant | 4.249*** | 0.03 | 3.986*** | 0.028 | 4.101*** | 0.03 |
| *a_3* | | | | | | |
| AC-score | 0.501*** | 0.01 | 0.448*** | 0.011 | 0.463*** | 0.011 |
| constant | 5.347*** | 0.01 | 5.094*** | 0.035 | 5.621*** | 0.04 |
| N | 11,012 | | 11,210 | | 10,361 | |
| log likelihood | -147809.51 | | -153615.65 | | -140581.61 | |
| $R^2$ | 0.925 | | 0.92 | | 0.925 | |
| SRMR | 0.051 | | 0.052 | | 0.051 | |
| RMSEA | 0.087 | | 0.086 | | 0.082 | |

Table 5.A3: Personality and spell of unemployment between 2009 and 2013 - subsample of individuals who experienced unemployment

| | (1) full | | (2) female | | (3) male | |
|---|---|---|---|---|---|---|
| | Coeff. | Std. Err. | Coeff. | Std. Err. | Coeff. | Std. Err. |
| $\Delta unemployment_{(09-05)}$ | 0.601*** | (0.014) | 0.556*** | (0.018) | 0.666*** | (0.022) |
| $AC\text{-}score_{09}$ | -0.104** | (0.042) | -0.104* | (0.054) | -0.098 | (0.063) |
| $cognitive_{09}$ | -0.116*** | (0.030) | -0.131*** | (0.040) | -0.105** | (0.046) |
| *men* | 0.089*** | (0.029) | | | | |
| *age* | -0.041*** | (0.014) | -0.023 | (0.018) | -0.061*** | (0.022) |
| $age^2$ | 0.000*** | (0.000) | 0.000 | (0.000) | 0.001*** | (0.000) |
| *family status* | 0.048*** | (0.012) | 0.040*** | (0.015) | 0.077*** | (0.019) |
| *german* | 0.007 | (0.061) | -0.004 | (0.080) | 0.040 | (0.091) |
| *state* | 0.005 | (0.003) | 0.005 | (0.004) | 0.006 | (0.005) |
| *constant* | 0.803** | (0.341) | 0.597 | (0.439) | 1.009* | (0.530) |
| N | 2,353 | | 1,342 | | 1,011 | |
| $R^2$ | 0.505 | | 0.479 | | 0.553 | |

Robust standard errors in parentheses. ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$
*Dependent variable:* Spell of unemployment between 2009 and 2013.

## Theoretical correlation matrix

In this Section the theoretical correlation matrix used for the estimation of the latent factor structure model is derived. Explanations are on the basis of Backhaus et al. (2015), see Brown (2014) for an introduction into confirmatory analysis. The measurement model for standardized indicator variables[14] $x_{ik}$ with $i = 1,...,9$ and $k$ individuals, and factors $f_1 = cognitive$ and $f_2 = AC\text{-}score$ looks as follows:

$$x_{1k} = \lambda_{11} \cdot f_{1k} + \varepsilon_{1k} \tag{5.12}$$
$$x_{2k} = \lambda_{21} \cdot f_{1k} + \varepsilon_{2k} \tag{5.13}$$
$$x_{3k} = \lambda_{31} \cdot f_{1k} + \varepsilon_{3k} \tag{5.14}$$

$$x_{4k} = \lambda_{42} \cdot f_{2k} + \varepsilon_{4k} \tag{5.15}$$
$$x_{5k} = \lambda_{52} \cdot f_{2k} + \varepsilon_{5k} \tag{5.16}$$
$$x_{6k} = \lambda_{62} \cdot f_{2k} + \varepsilon_{6k} \tag{5.17}$$
$$x_{7k} = \lambda_{72} \cdot f_{2k} + \varepsilon_{7k} \tag{5.18}$$
$$x_{8k} = \lambda_{82} \cdot f_{2k} + \varepsilon_{8k} \tag{5.19}$$
$$x_{9k} = \lambda_{92} \cdot f_{2k} + \varepsilon_{9k} \tag{5.20}$$

For the theoretical correlation matrix we correlate every indicator variable against every other.

$$r_{x_i,x_j} = \frac{1}{K} \sum_k x_{ik} \cdot x_{jk} \tag{5.21}$$

where $i = 1,...,9$ and $j = 1,...,9$.

There are three cases which might arise:

1. an indicator variable is correlated against itself ($i = j$),
2. two different indicator variables were correlated but both depend on the same factor ($i \neq j$),
3. two different indicator variables were correlated which do not depend on the same factor ($i \neq j$).

[14] $x_{1k} = \frac{educ\_w_{1k} - \overline{educ\_w}}{sd_{educ\_w}}$

The covariances of the factors are defined as $Cov(f_1, f_1) = \Phi_{f_1,f_1} = 1$, $Cov(f_2, f_2) = \Phi_{f_2,f_2} = 1$, and $Cov(f_1, f_2) = \Phi_{f_1,f_2} = 0$.

Inserting equations (5.12) to (5.20) into equation (5.21) and assuming that disturbance terms are not correlated, and that factors and disturbance terms are uncorrelated, too, yields:

for case (i):

$$\begin{aligned} r_{x_i,x_i} &= \frac{1}{K}\sum_k (\lambda_{i1} f_{1k} + \varepsilon_{ik})(\lambda_{i1} f_{1k} + \varepsilon_{ik}) \\ &= \frac{1}{K}\sum_k [(\lambda_{i1} \cdot f_{1k} \cdot \lambda_{i1} \cdot f_{1k}) + (\lambda_{i1} \cdot f_{1k} \cdot \varepsilon_{ik}) + (\varepsilon_{ik} \cdot \lambda_{i1} \cdot f_{1k}) + (\varepsilon_{ik} \cdot \varepsilon_{ik})] \\ &= \lambda_{i1} \cdot \lambda_{i1} \cdot \frac{1}{K}\sum_k f_{1k} \cdot f_{1k} + \lambda_{i1} \cdot \frac{1}{K}\sum_k f_{1k} \cdot \varepsilon_{ik} + \lambda_{i1} \cdot \frac{1}{K}\sum_k \varepsilon_{ik} \cdot f_{1k} + \frac{1}{K}\sum_k \varepsilon_{ik} \cdot \varepsilon_{ik} \\ &= \lambda_{i1} \cdot \lambda_{i1} \cdot \Phi_{f_1,f_1} + \lambda_{i1} \cdot r_{f_1,\varepsilon_i} + \lambda_{i1} \cdot r_{\varepsilon_i,f_1} + r_{\varepsilon_i,\varepsilon_i}. \\ &= \lambda_{i1}^2 + \varepsilon_i^2 \end{aligned}$$

for case (ii):

$$\begin{aligned} r_{x_i,x_j} &= \frac{1}{K}\sum_k (\lambda_{i1} f_{1k} + \varepsilon_{ik})(\lambda_{j1} f_{1k} + \varepsilon_{jk}) \\ &\vdots \\ &= \lambda_{i1} \cdot \lambda_{j1} \cdot \Phi_{f_1,f_1} + \lambda_{i1} \cdot r_{f_1,\varepsilon_j} + \lambda_{j1} \cdot r_{\varepsilon_i,f_1} + r_{\varepsilon_i,\varepsilon_j}. \\ &= \lambda_{i1} \cdot \lambda_{j1} \end{aligned}$$

and for case (iii):

$$\begin{aligned} r_{x_i,x_j} &= \frac{1}{K}\sum_k (\lambda_{i1} f_{1k} + \varepsilon_{ik})(\lambda_{j2} f_{2k} + \varepsilon_{jk}) \\ &\vdots \\ &= \lambda_{i1} \cdot \lambda_{j2} \cdot \Phi_{f_1,f_2} + \lambda_{i1} \cdot r_{f_1,\varepsilon_j} + \lambda_{j2} \cdot r_{\varepsilon_i,f_2} + r_{\varepsilon_i,\varepsilon_j}. \\ &= 0 \end{aligned}$$

This leads to the theoretical correlation matrix $\hat{\sum}$:

$$\hat{\sum} = \begin{bmatrix} \lambda_{11}^2 + \varepsilon_1^2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \lambda_{11}\lambda_{21} & \lambda_{21}^2 + \varepsilon_2^2 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \lambda_{11}\lambda_{31} & \lambda_{21}\lambda_{31} & \lambda_{31}^2 + \varepsilon_3^2 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \lambda_{42}^2 + \varepsilon_4^2 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \lambda_{42}\lambda_{52} & \lambda_{52}^2 + \varepsilon_5^2 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \lambda_{42}\lambda_{62} & \lambda_{52}\lambda_{62} & \lambda_{62}^2 + \varepsilon_6^2 & 0 & 0 & 0 \\ 0 & 0 & 0 & \lambda_{42}\lambda_{72} & \lambda_{52}\lambda_{72} & \lambda_{62}\lambda_{72} & \lambda_{72}^2 + \varepsilon_7^2 & 0 & 0 \\ 0 & 0 & 0 & \lambda_{42}\lambda_{82} & \lambda_{52}\lambda_{82} & \lambda_{62}\lambda_{82} & \lambda_{72}\lambda_{82} & \lambda_{82}^2 + \varepsilon_8^2 & 0 \\ \lambda_{11}\lambda_{92}\Phi_{f_1,f_2} = 0 & 0 & 0 & \lambda_{42}\lambda_{92} & \lambda_{52}\lambda_{92} & \lambda_{62}\lambda_{92} & \lambda_{72}\lambda_{92} & \lambda_{82}\lambda_{92} & \lambda_{92}^2 + \varepsilon_9^2 \end{bmatrix}$$

Parameters are estimated to minimize the discrepancy function which is between $\hat{\sum}$ and the empirical correlation matrix.

# Bibliography

Acemoglu, D., Naidu, S., Restrepo, P., Robinson, J. A., 2015. Democracy, redistribution and inequality. In: Atkinson, A. B., Bourgignon, F. (Eds.), Handbook of Income Distribution. Vol. 2B. Elsevier, New York etc., pp. 1885–1966.

Alesina, A., Di Tella, R., MacCulloch, R., 2004. Inequality and happiness: Are Europeans and Americans different? Journal of Public Economics 88 (9), 2009–2042.

Alesina, A., La Ferrara, E., 2005. Preferences for redistribution in the land of opportunities. Journal of Public Economics 89, 897–931.

Almlund, M., Duckworth, A. L., Heckman, J., Kautz, T., 2011. Personality psychology and economics. In: Hanushek, E. A., Machin, S., Woessmann, L. (Eds.), Handbook of the Economics of Education. No. 4. Elsevier, pp. 1–690.

Althaus, S., 1998. Information effects in collective preferences. American Political Science Review 92, 545–558.

Backhaus, K., Erichson, B., Weiber, R., 2015. Fortgeschrittene multivariate Analysemethoden: Eine anwendungsorientierte Einführung. Springer-Verlag.

Barrick, M. R., Mount, M. K., 1991. The big five personality dimensions and job performance: A meta-analysis. Personnel Psychology 44 (1), 1–26.

Bartels, L. M., 1996. Uninformed votes: Information effects in presidential elections. American Journal of Political Science 40, 194–230.

Bartels, L. M., 2005. Homer gets a tax cut: Inequality and public policy in the American mind. Perspectives on Politics 3, 15–31.

Bartels, L. M., 2008. Unequal Democracy: The Political Economy of the New Gilded Age. Princeton University Press, Princeton, NJ.

Benabou, R., Ok, E. A., 2001. Social mobility and the demand for redistribution: The POUM hypothesis. Quarterly Journal of Economics 116, 447–487.

Bjoernskov, C., Dreher, A., Fischer, J. A., Schnellenbach, J., Gehring, K., 2013. Inequality and happiness: When perceived social mobility and economic reality do not match. Journal of Economic Behavior and Organization 91, 75–92.

Blais, A., 2000. To vote or not to vote? The merits and limits of rational choice theory. University of Pittsburgh Press.

Blummer, D., Benson, D., 1975. Personality changes with frontal and temporal lobe lesions. Psychiatric Aspects of Neurologic Disease. DF Benson & D. Blume, Eds, 151–170.

Borge, L.-E., Rattsoe, J., 2004. Income distribution and tax structure: Empirical test of the Meltzer-Richard hypothesis. European Economic Review 48, 805–826.

Borghans, L., Duckworth, A. L., Heckman, J. J., Ter Weel, B., 2008. The economics and psychology of personality traits. Journal of Human Resources 43 (4), 972–1059.

Boyce, C. J., Wood, A. M., 2011. Personality and the marginal utility of income: Personality interacts with increases in household income to determine life satisfaction. Journal of Economic Behavior & Organization 78 (1), 183–191.

Boyce, C. J., Wood, A. M., Brown, G. D., 2010. The dark side of conscientiousness: Conscientious people experience greater drops in life satisfaction following unemployment. Journal of Research in Personality 44 (4), 535–539.

Bredemeier, C., 2014. Imperfect information and the Meltzer-Richard hypothesis. Public Choice (forthcoming).

Brooks, C., Manza, J., 2006. Social policy responsiveness in developed democracies. American Sociological Review 71, 474–494.

Brown, T. A., 2014. Confirmatory factor analysis for applied research. Guilford Publications.

Browne, M. W., Cudeck, R., et al., 1993. Alternative ways of assessing model fit. Sage Focus Editions 154, 136–136.

Caliendo, M., Cobb-Clark, D. A., Uhlendorff, A., 2015. Locus of control and job search strategies. Review of Economics and Statistics 97 (1), 88–103.

Caplan, B., 2007. The myth of the rational voter: Why democracies choose bad policies. Princeton University Press, Princeton/Oxford.

Cattan, S., 2010. Heterogeneity and selection in the labor market. PhD thesis, University of Chicago.

Cobb-Clark, D. A., Schurer, S., 2012. The stability of big-five personality traits. Economics Letters 115 (1), 11–15.

Cobb-Clark, D. A., Tan, M., 2011. Noncognitive skills, occupational attainment, and relative wages. Labour Economics 18 (1), 1–13.

Corneo, G., Grüner, H.-P., 2002. Individual preferences for political redistribution. Journal of Public Economics 83, 83–107.

Costa, P. T., McCrae, R. R., 1992. Four ways five factors are basic. Personality and Individual Differences 13 (6), 653–665.

Cowell, F. A., Flachaire, E., 2015. Statistical methods for distributional analysis. In: Atkinson, A. B., Bourgignon, F. (Eds.), Handbook of Income Distribution. Vol. 2A. Elsevier, New York etc., pp. 359–465.

Cruces, G., Perez-Truglia, R., Tetaz, M., 2013. Biased perception of income distribution and preferences for redistribution: Evidence from a survey experiment. Journal of Public Economics 98, 100–112.

Cuesta, B. M., Budría, S., 2017. Unemployment persistence: How important are noncognitive skills? Journal of Behavioral and Experimental Economics (formerly The Journal of Socio-Economics) 69 (C), 29–37.

Cunha, F., Heckman, J. J., Schennach, S. M., 2010. Estimating the technology of cognitive and noncognitive skill formation. Econometrica 78 (3), 883–931.

Damasio, A. R., 1994. Descartes' error: Emotion, rationality and the human brain.

D'Ambrosio, C., Clark, A. E., 2015. Attitudes to income inequality: Experimental and survey evidence. In: Atkinson, A. B., Bourguignon, F. (Eds.), Handbook of Income Distribution. Vol. 2. North-Holland, Amsterdam etc., pp. 1147–1208.

DeNardo, J., 1980. Turnout and the vote: The joke's on the democrats. American Political Science Review 74 (02), 406–420.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., 2008. Representative trust and reciprocity: Prevalence and determinants. Economic Inquiry 46 (1), 84–90.

Dohmen, T., Falk, A., Huffman, D., Sunde, U., 2009. Homo reciprocans: Survey evidence on behavioural outcomes. The Economic Journal 119 (536), 592–612.

Duch, R. M., Palmer, H. D., Anderson, C. J., 2000. Heterogeneity in perceptions of national economic conditions. American Journal of Political Science 44 (4), 635–652.

Duflo, E., Saez, E., 2003. The role of information and social interactions in retirement plan decisions: Evidence from a randomized experiment. The Quarterly Journal of Economics 118 (3), 815–842.

Egan, M., Daly, M., Delaney, L., Boyce, C. J., Wood, A. M., 2017. Adolescent conscientiousness predicts lower lifetime unemployment. Journal of Applied Psychology 102 (4), 700.

Engelhardt, C., Wagener, A., 2014. Biased perceptions of income inequality and redistribution. CESifo Working Paper No. 4838, CESifo, Munich.

Engelhardt, C., Wagener, A., 2017. What do germans think and know about income inequality? A survey experiment. Socio-Economic Review (forthcoming).

Evans, M., Kelley, J., 2004. Subjective social location: Data from 21 nations. International Journal of Public Opinion Research 16, 3–38.

Finseraas, H., 2009. Income inequality and demand for redistribution: A multilevel analysis of European public opinion. Scandinavian Political Studies 32 (1), 94–119.

Fletcher, J. M., 2013. The effects of personality traits on adult labor market outcomes: Evidence from siblings. Journal of Economic Behavior & Organization 89, 122–135.

Fujii, E. T., Hawley, C. B., 1988. On the accuracy of tax perceptions. Review of Economics and Statistics 70 (2), 344–347.

Fumagalli, E., Narciso, G., 2012. Political institutions, voter turnout, and policy outcomes. European Journal of Political Economy 28 (2), 162–173.

Galbraith, J. K., Hale, J. T., 2008. State income inequality and presidential election turnout and outcomes. Social Science Quarterly 89 (4), 887–901.

Gallego, A., 2010. Understanding unequal turnout: Education and voting in comparative perspective. Electoral Studies 29, 239–248.

Gärling, T., Gamble, A., 2008. Perceived inflation and expected future prices in different currencies. Journal of Economic Psychology 29 (4), 401–416.

Georgiadis, A., Manning, A., 2012. Spend it like Beckham? Inequality and redistribution in the UK, 1983-2004. Public Choice 151, 537–563.

Gimpelson, V., Treisman, D., 2015. Misperceiving inequality. NBER Working Paper No. 21174, National Bureau of Economic Research, Cambridge, MA.

Gouveia, M., Masia, N. A., 1998. Does the median voter model explain the size of government? Evidence from the States. Public Choice 97, 159–177.

Guenther, C. L., Alicke, M. D., 2010. Deconstructing the Better-than-Average effect. Journal of Personality and Social Psychology 99, 755–770.

Heckman, J. J., Humphries, J. E., Urzua, S., Veramendi, G., 2010. The effects of schooling on labor market and health outcomes. Unpublished Manuscript. University of Chicago, Department of Economics.

Heckman, J. J., Stixrud, J., Urzua, S., 2006. The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. Journal of Labor Economics 24 (3), 411–482.

Heineck, G., Anger, S., 2010. The returns to cognitive abilities and personality traits in Germany. Labour Economics 17 (3), 535–546.

Hornik, R., 1989. The knowledge-behavior gap in public information campaigns: A development communication view. In: Salmon, C. T. (Ed.), Information Campaigns: Balancing Social Values and Social Change. Sage, London, pp. 113–138.

Hu, L.-t., Bentler, P. M., 1999. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal 6 (1), 1–55.

Jacob, B. A., Lefgren, L., 2008. Can principals identify effective teachers? Evidence on subjective performance evaluation in education. Journal of Labor Economics 26, 101–136.

Jann, B., 2016. Estimating Lorenz and concentration curves in STATA. Tech. rep., University of Bern, Department of Social Sciences.

Jenderny, K., Bartels, C., 2015. The role of capital income for top income shares in Germany. The World Top Incomes Database Working Paper 2015/1.

Jensen, R., 2010. The (perceived) returns to education and the demand for schooling. Quarterly Journal of Economics 125 (2), 515–548.

Judge, T. A., Heller, D., Mount, M. K., 2002. Five-factor model of personality and job satisfaction: A meta-analysis. Journal of Applied Psychology 87 (3), 530–541.

Karadja, M., Mollerstrom, J., Seim, D., 2017. Richer (and holier) than thou? The effect of relative income improvements on demand for redistribution. Review of Economics and Statistics.

Kautz, T., Heckman, J. J., Diris, R., Ter Weel, B., Borghans, L., 2014. Fostering and measuring skills: Improving cognitive and non-cognitive skills to promote lifetime success. Tech. rep., National Bureau of Economic Research.

Kenworthy, L., McCall, L., 2008. Inequality, public opinion and redistribution. Socio-Economic Review 6, 35–68.

Kenworthy, L., Pontusson, J., 2005. Rising inequality and the politics of redistribution in affluent countries. Perspectives on Politics 3, 449–471.

Kovacevic, M. S., Binder, D. A., 1997. Variance estimation for measures of income inequality and polarization – the estimating equations approach. Journal of Official Statistics 13 (1), 41–58.

Larcinese, V., 2007. Voting over redistribution and the size of the welfare state: The role of turnout. Political Studies 55, 568–585.

Lijphart, A., 1997. Unequal participation: Democracy's unresolved dilemma. American Political Science Review 91 (01), 1–14.

Lindbeck, A., Nyberg, S., Weibull, J. W., 1999. Social norms and economic incentives in the welfare state. Quarterly Journal of Economics 114 (1), 1–35.

Lindert, P., 1996. What limits social spending? Explorations in Economic History 33, 1–34.

Lübker, M., 2006. Inequality and the demand for redistribution: Are assumptions of the new growth theory valid? Socio-Economic Review 5, 117–148.

Lupu, N., Pontusson, J., 2011. The structure of inequality and the politics of redistribution. American Political Science Review 105 (2), 316–336.

Lutz, G., Marsh, M., 2007. Introduction: Consequences of low turnout. Electoral Studies 26, 539–547.

Mahler, V. A., 2008. Electoral turnout and income redistribution by the state: A cross-national analysis of developed democracies. European Journal of Political Research 47, 161–183.

Mahler, V. A., Jesuit, D. K., Paradowski, P. R., 2014. Electoral turnout and state redistribution: A cross-national study of 14 developed countries. Political Research Quarterly 67, 361–373.

McGee, A. D., 2015. How the perception of control influences unemployed job search. ILR Review 68 (1), 184–211.

Meltzer, A. H., Richard, S. F., 1981. A rational theory of the size of government. The Journal of Political Economy 89 (5), 914–927.

Meltzer, A. H., Richard, S. F., 1983. Tests of a rational theory of the size of government. Public Choice 41 (3), 403–418.

Milanovic, B., 2000. The median-voter hypothesis, income inequality, and income redistribution: An empirical test with the required data. European Journal of Political Economy 16 (3), 367–410.

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., Houts, R., Poulton, R., Roberts, B. W., Ross, S., et al., 2011. A gradient of childhood self-control predicts health, wealth, and public safety. Proceedings of the National Academy of Sciences 108 (7), 2693–2698.

Mueller, D. C., Stratmann, T., 2003. The economic effects of democratic participation. Journal of Public Economics 87 (9), 2129–2155.

Mueller, G., Plug, E., 2006. Estimating the effect of personality on male and female earnings. ILR Review 60 (1), 3–22.

Niehues, J., 2014. Subjective perceptions of inequality and redistributive preferences: An international comparison. Discussion paper, Cologne Institute for Economic Research (IW), Cologne.

Norton, M. I., Ariely, D., 2011. Building a better America – one wealth quintile at a time. Perspectives on Psychological Science 6, 9–12.

Nyhus, E. K., Pons, E., 2005. The effects of personality on earnings. Journal of Economic Psychology 26 (3), 363–384.

Olken, B. A., 2009. Corruption perceptions vs. corruption reality. Journal of Public Economics 93 (7-8), 950–964.

Osberg, L., Smeeding, T., 2006. "Fair" inequality? Attitudes toward pay differentials: The United States in comparative perspective. American Sociological Review 71, 450–473.

Pecoraro, B., 2014. Inequality in democracies: Testing the classic democratic theory of redistribution. Economics Letters 123, 398–401.

Perez-Truglia, R., 2016. The effects of income transparency on well-being: Evidence from a natural experiment. Tech. rep., Microsoft Research.

Perkins, A., 2016. The Welfare Trait: How state benefits affect personality. Springer.

Persson, T., Tabellini, G., 2000. Political Economics: Explaining economic policy. The MIT Press, Cambridge, MA.

Petterson, P. A., Rose, L. E., 2007. The dog that didn't bark: Would increased electoral turnout make a difference? Electoral Studies 26, 574–588.

Podsakoff, P. M., MacKenzie, S. B., Paine, J. B., Bachrach, D. G., 2000. Organizational citizenship behaviors: A critical review of the theoretical and empirical literature and suggestions for future research. Journal of Management 26 (3), 513–563.

Pontusson, J., Rueda, D., 2010. The politics of inequality: Voter mobilization and left parties in advances industrial states. Comparative Political Studies 43, 675–705.

Powell Jr., B. G., 1980. Voting turnout in thirty democracies: Partisan, legal, and socio-economic influences. In: Rose, R. (Ed.), Electoral participation: A comparative analysis. Sage, London, pp. 5–34.

Roberts, B. W., 2009. Back to the future: Personality and assessment and personality development. Journal of Research in Personality 43 (2), 137–145.

Rodrìguez, F. C., 1999. Does distributional skewness lead to redistribution? Evidence from the United States. Economics and Politics 11 (2), 171–199.

Romer, T., 1975. Individual welfare, majority voting and the properties of a linear income tax. Journal of Public Economics 4 (2), 163–185.

Rosema, M., 2007. Low turnout: Threat to democracy or blessing in disguise? Consequences of citizens' varying tendencies to vote. Electoral Studies 26, 612–623.

Runciman, W. G., 1966. Relative deprivation and social justice: A study of attitudes to social inequality in twentieth-century England. Routledge Kegan Paul, London.

Scervini, F., 2012. Empirics of the median voter: Democracy, redistribution and the role of the middle class. Journal of Economic Inequality 10, 529–550.

Schokkaert, E., Truyts, T., 2014. Preferences for redistribution and social structure. Discussion paper 14.01, Center for Economic Studies, KU Leuven.

Semykina, A., Linz, S. J., 2007. Gender differences in personality and earnings: Evidence from Russia. Journal of Economic Psychology 28 (3), 387–410.

Solt, F., 2010. Does economic inequality depress electoral participation? Testing the Schattschneider hypothesis. Political Behavior 32 (2), 285–301.

Stevenson, R. T., Duch, R., 2013. The meaning and use of subjective perceptions in studies of economic voting. Electoral Studies 32 (2), 305–320.

Störmer, S., Fahr, R., 2013. Individual determinants of work attendance: Evidence on the role of personality. Applied Economics 45 (19), 2863–2875.

Thiel, H., Thomsen, S. L., 2013. Noncognitive skills in economics: Models, measurement, and empirical evidence. Research in Economics 67 (2), 189–214.

Tichenor, P. J., Donohue, G. A., Olien, C. N., 1970. Mass media flow and differential growth in knowledge. Public Opinion Quarterly 34 (2), 159–170.

Tonge, W. L., James, D. S., Hillam, S. M., 1975. Families without hope: A controlled study of 33 problem families. No. 11. Headley [for the] Royal College of Psychiatrists.

Tonge, W. L., Lunn, J., Greathead, M., McLaren, S., 1981. A follow-up to the adult sons and daughters of Sheffield problem and comparison families originally reported by Tonge, James and Hilliam in 1975. Social Science Research Council.

Tóth, I. G., Keller, T., et al., 2011. Income distributions, inequality perceptions and redistributive claims in European societies.

Trump, K.-S., 2014. Income inequality influences perceptions of legitimate income differences. Discussion Paper, Harvard University, Department of Government.

Uysal, S. D., Pohlmeier, W., 2011. Unemployment duration and personality. Journal of Economic Psychology 32 (6), 980–992.

Verba, S., Nie, N. H., 1972. Participation in America. Harper & Row.

Verba, S., Nie, N. H., Kim, J.-o., 1978. Participation and political equality: A seven-nation comparison. University of Chicago Press.

Wells, R., Ham, R., Junankar, P. N., 2016. An examination of personality in occupational outcomes: Antagonistic managers, careless workers and extraverted salespeople. Applied Economics 48 (7), 636–651.